

Remodeled Lessons: (6-9)

The following links provide examples of remodeled lessons found in *The Critical Thinking Handbook: 6th-9th Grades*.

The basic idea behind lesson plan remodeling as a strategy for staff development in critical thinking is simple. Every practicing teacher works daily with lesson plans of one kind or another. To remodel lesson plans is to critique one or more lesson plans and formulate one or more new lesson plans based on that critical process.

To help teachers generalize from specific remodeling moves, and so facilitate their grasp of strong sense critical thinking and how it can be taught, we have devised a list of teaching strategies, which are outlined in *Strategy List: 35 Dimensions of Critical Thought*. Each strategy highlights an aspect of critical thought. Each use of it illustrates how that aspect can be encouraged in students.

Complete remodeled lessons have three major components:

- 1) an "Original Lesson", or statement of the "Standard Approach" (which describes the topic and how it is covered, including questions and activities);
- 2) the "Critique" (which describes the significance of the topic and its value for the educated thinker, evaluates the original, and provides a general idea of how the lesson can be remodeled);
- 3) "Remodeled Lesson" (which describes the new lesson, gives questions to be posed to students and student activities, and cites the critical thinking strategies by number).

The strategy number generally follows the questions or activities it represents. Complete remodel sets also include a list of "Objectives" which integrate the objectives of the original with the critical thinking goals; and the list of critical thinking "Strategies" applied in the remodel (listed in order of first appearance).

- [Human Migration](#)
- [Integrated Grammar](#)
- [Journals](#)
- [Writing Argumentative Essays](#)
- [Insect Anatomy](#)

Human Migration

Objectives of the Remodeled Plan

The Students Will:

- come to understand in detail Baluchi nomadic life, comparing it to their own
- develop empathy with Iranian nomadic life styles, exercising fairmindedness
- identify complex factors of modern migratory patterns in the U.S.
- relate human migration to their personal lives and the future

Standard Approach

The lesson discusses the reasons people have for migrating, including the search to find food, resources and better opportunities or because they are forced to migrate. The lesson introduces the concept and vocabulary of nomads. It also discusses historical famines and the effect they had on forcing people to move.

The text discusses migration for better opportunities and briefly examines colonization. Forced migrations and the concept of refugees are briefly mentioned, and then the text considers present-day migrations. Movement to cities and warmer climates are mentioned. The teacher's edition suggests discussing modern forced migrations and recalling from the reading some of the facts concerning the reasons for migration given in the text.

Critique

The "Human" Part of Migration

This lesson deals with the reasons for migration. Several theories that are complex in nature are given to the teacher. One concept deals with the idea of "intervening opportunity." It suggests that the ways people look at distant opportunities are affected by the intervening opportunities.

A second passage briefly looks at the "push" and "pull" factors. Little effort is made to relate these theories in the text. Rather simple examples in factual form are listed. Migration is generally pictured in this as negative, only undertaken under duress. An underlying assumption is that migration is either a primitive socio-economic phenomenon or evidence of poorly-run governments or natural disaster.

No effort is made to relate the factors to human lives, to see the multi-faceted pluses and minuses in lives, or to ever place the nomadic life in a positive light. The Baluchis of southeast Iran had a semi-annual nomadic cycle where in the winter and spring they tended their herds in the mountains and in summer went to the south to harvest dates. The Shah, and before him his father, saw nomads as an embarrassment to a modern industrial country and they followed a forced plan of resettlement. This resulted in depriving these people of their traditional food sources, and they starved. When they resisted, the government flew in aircraft and machine-gunned them during their traditional migrations.

The traditional pattern of life for the Baluchi was one of pride, grace and cultural integrity. Living simply and close to nature gave them a way of life without the stress and materialism often associated with modern industrial city life.

The Multiple Perspectives of Colonization

The text makes it sound as if the only motivation for colonization was seeking a better place to live. Little detail about this motivation is given. Nor is any consideration given to the push and pull factors in colonization. Many motivations for countries to support and pursue colonization are ignored. The exploitation of the local peoples, the destruction of traditional life patterns and the power struggles that resulted between the nations of Europe are overlooked. Instead this migratory pattern is seen simply as people looking for personal opportunities, freedom and a new way of life.

The Conflicts of Modern Migrations

The text again makes it sound as if the factors in modern migration, the move to cities and warm climates, are simple. People move to cities for jobs, but no mention is made of the negatives in the cities, both historically and today, including high unemployment in cities, lack of training of new workers, and typical urban problems such as crime, overcrowding and smog. The effect that this migration has on farms and rural areas is not even explored.

Children in my area need to come to terms with these factors. I live in a very rural area which presents excellent living conditions but limited job opportunities. Often the students I work with think simply going to L.A. after graduation will solve all their problems. They often lack the social skills, and educational training or perspectives to migrate successfully to the urban areas.

Suggestions for Improvement

Generally, the factors discussed in motivating migration are oversimplified, and traditional migration patterns, particularly in the U.S., are seen as simply going from bad economic situations to positive ones. The complexity of the issue is ignored completely.

The remodeled plan is focused on the people of traditional migratory patterns and the nomads. It helps the children to see the qualities of their own lives. In considering modern migration from rural to urban settings, their thinking needs to be extended to see the many issues both motivating and limiting these movements.

Strategies Used to Remodel

These refer to subsections of *Strategy List: 35 Dimensions of Critical Thought*.

- S-29 noting significant similarities and differences
- S-3 exercising fairmindedness

- S-21 reading critically: clarifying or critiquing texts
- S-10 refining generalizations and avoiding oversimplifications
- S-24 practicing Socratic discussion: clarifying and questioning beliefs, theories, or perspectives

My remodeled lesson plan basically follows the organization and sequence of the original lesson, but it has two major focuses. The first focus is on the migratory patterns of nomads in traditional society first, and then upon modern migratory patterns that the children would be more familiar with.

The Traditional Migratory Pattern of the Baluchi in Iran

As a Peace Corps volunteer in Iran, I spent much time with the nomadic Baluchi tribes of southeastern Iran and Pakistan. I would begin by showing movies and bringing in various artifacts of the Baluchis, including a wedding coat, a camel saddle bag and articles of clothing.

Through discussion and demonstration, I would clarify exactly what a migratory pattern was, in this case being a seasonal migration between high pastures and low date palm orchards. I think it is important for the students by their own examination and discussion to understand how the life style limits their belongings and how it places certain controls on social patterns including marriage and the education of the children.

Once the students had a clear understanding of the meaning of nomads and migration, they would need to examine in detail how the Baluchi life was similar to and different from their own. We would examine some important values in our own culture and compare them to how the Baluchis dealt with similar issues. Of particular interest to these students would be arranged marriages and the youthfulness of the brides, the separation of the sexes and materialism or possessions. I would stress that models of living and reality itself are complex and self-sufficient, showing how their ways and ours are different but one way is not good and another bad. S-29 Because the social structure of the Middle East (and particularly Iran) is often viewed negatively here, this aspect will be quite challenging.

Once the students understand this aspect of the lesson, I would take them on to actually act out or plan a nomadic life style. Considering the plight of the homeless might be helpful here if it does not confuse the issue, but I think if the children have any awareness of this social issue, it needs to be addressed. The children would figure out what it would feel like to be nomadic, what belongings they would choose, and what modes of transportation they could adopt.

Other social issues could also be experienced, including arranged marriages and separation of the girls from the boys. The goal here would be to have the students understand the lifestyle from the nomadic point of view. Then I would discuss with them the forced settlement plan adopted by the government and have the children see the thinking from the Baluchi's point of view and the government's. S-3

By now, hopefully, I would have pointed out some of the positive aspects of the nomadic life style and the children would be ready to critique the text and identify some of the assumptions the text makes. S-21 This seems very important to me because the students I generally teach seldom consider that a text could be wrong, incomplete or misleading.

The Process of Identifying Migratory Patterns

The process of identifying assumptions would continue on to the second part of this lesson plan considering modern migratory patterns. Particularly we would explore the movement from rural living to urban living. We would need to discover the complexity of this issue, the various factors leading people to move to the city and what happens to them there. The assumption in my classroom generally, and also, though less so, in the text, is that life is better in the city. Through question and answer and research, the students would come to avoid the oversimplification found in the text. S-10

Finally, I would conclude this lesson with a Socratic discussion of why people leave Lone Pine (my town) to move to various urban settings (primarily Los Angeles). Important issues to be brought out would be motivation, preparation for a successful move, goals, quality of life, and impact on the city, more so on the local rural areas of the young moving away. Polling the students on their short-range and long-range goals would provide an interesting and enlightening closure activity for the class. S-24

Integrated Grammar

Objectives of the Remodeled Plan

The Students Will:

- explore their ideas about language through Socratic discussion
- analyze a written passage and distinguish author's grammatical usage in terms of style
- evaluate a written passage

Standard Approach

The traditional pattern is based upon a format which explains the lesson, gives examples, and then provides drills for students on such topics as the following: parts of speech, verb tenses, active vs. passive verbs, dependent and independent clauses, punctuation. The simplicity or complexity of the lesson depends upon the grade level of the text.

Critique

Grammar was chosen as a lesson because it seems the least likely to be included in a discussion on critical thinking. Indeed, the traditional method utilized in grammar texts does discourage reasoning about grammar.

The facts of English are presented in a raw fashion and the student simply is expected to accept them. Some grammar texts attempt to be innovative by making grammar "fun" - using graphics and clever sentences for examples, but the message is the same: Grammar is a subject that students must learn. Soon they get the message that it is boring and worse than that, difficult and irrational. Students learn each distinction and skill in such a way that they only "know" it when specifically asked to look for it in the directions. They do not learn the details in any useful context, whether reading or writing. Students need to use grammatical analysis in order to see its importance and meaning.

Integrated Grammar is a method which was presented at a California Model Curriculum Conference. The premise is that if grammar is taught, it should be within the context of the literature that is being taught. Grammar is not a genre and it is something that we would have no use for if we didn't have something to communicate. It makes sense then to have students learn about grammar from literature and other writings. Most teachers would prefer to teach something else when given the choice. How then does a teacher who wishes to incorporate critical thinking into all areas of the curriculum teach grammar?

These refer to subsections of *Strategy List: 35 Dimensions of Critical Thought*.

Strategies Used to Remodel

- S-1 thinking independently
- S-24 practicing Socratic discussion: clarifying and questioning beliefs, theories, or perspectives
- S-21 reading critically: clarifying or critiquing texts

General Discussion of Language S-24

Before teachers attempt an integrated grammar lesson, the class can be divided into groups of three or four and asked some critical questions about the structure of their language. Ask one or two questions at a time, and ask one student in the group to volunteer to record the group's answers.

What are some rules a person would have to know to speak English?

How do humans acquire language? At what age? Explain exactly how it is done. What do you remember about your own language acquisition?

Are all people taught grammar and, if so, at what age do they learn it? If there are younger children at home, how are they learning (did they learn), and what mistakes did they make? Why did he say that? Why was it a mistake?

Who determines what correct English will be? What implications does this have for society?

What is the definition of syntax? (OK to use the dictionary.) Does word order matter in English? (For example, does the sentence, "Help my dog eat," and the sentence, "Help eat my dog," mean the same thing?) If someone in your group speaks another language, find out if word order is important in the construction of their language.

What are the implications for a person who cannot speak at all? How do they communicate? How important is language of any kind to a person?

What are some things you would like to know about language that you were never taught?

By this time, you have involved students in thinking deeply about the importance of language. This process awakens intellectual curiosity instead of deadening it with grammar drills. The teacher may spend as much time as she likes exploring fundamental assumptions about language.

You may want to assign a writing project in which one group writes a paragraph then changes the word order in each sentence. For example, ask each group to collaborate on a short paragraph about the way children learn language. A partial response might be: Children learn language at a very young age. Their parents are the main teachers, but sometimes children just repeat things they hear. Then ask the group to mix up the syntax using the same words: Very young language learn at a children age. Teachers sometimes but main parents repeat just the children are their things they hear. Groups exchange papers and try to decipher each other's paragraphs to make sense. Students could share their methods of approaching this problem. It soon dawns on students that language has a rigid structure and that although they may not be able to recite the rules governing syntax, they know them. Students that speak a non-standard variety of English could compare their syntax with standard English and generate rules for translating.

Grammar in Literature S-21

First, choose a short passage that is exceptionally descriptive, exciting or well written. Then ask students to write down the passage while you dictate it. This improves their listening and note-taking skills. Students could later compare different ways of using punctuation to write the passage.

The following passage is from John Steinbeck's *The Pearl*:

The scorpion moved delicately down the rope toward the box. Under her breath Juana repeated an ancient magic to guard against such evil, and on top of that she muttered a Hail Mary between clenched teeth. But Kino was in motion. His body glided quietly across the room, noiselessly and smoothly. His hands were in front of him, palms down, and his eyes were on the scorpion. Beneath it in the hanging box Coyotito laughed and reached up his hand toward it. It sensed danger when Kino was almost within reach of it. It stopped and its tail rose up over its back in little jerks and the curved thorn on the tail's end glistened.

Because students have written the passage, they are more prepared for the analysis you will ask them to do. Place them in groups to work on the following questions: List some things that you notice about the writing style of this author. S-1 Go through the passage and write down some verbs that worked especially well. Go through the passage and write down some nouns with their adjectives that made the passage more vivid. How do the adverbs contribute to the passage? List some positive and negative criticism you have of this author's writing style. S-21

This lesson will have students thinking about the way the grammar works in the passage. Students will develop a sense of what is powerful in writing and be able to generalize rules that will improve their own work. As a closing exercise, ask students to write a paragraph in which they imitate Steinbeck's style. They should be encouraged to invent their own fiction and not write a passage about a scorpion. These models of Steinbeck's style can be shared with the class and analyzed for points of comparison.

Journals

Objectives of the Remodeled Plan

The Teacher Will:

- revise journal prompts to require critical thought
- compose thought-provoking journal prompts
- design writing assignments based on journal entries

Standard Approach

Journal writing may be approached in many ways. This lesson instructs students to make daily entries in a journal based on prompts. Example of prompts are:

- If you were an animal, what kind would you be?
- List all the things that are bothering you at this moment.

- What you wish . . .
- Keep track of your dreams and comment on them.
- I would like to change . . .

Twenty such prompts were listed on a page. Journals may be evaluated by the teacher periodically or peer evaluated.

Critique

Personal journal writing is a worthwhile activity. Students improve their writing skills and explore feelings and opinions. They feel freer, and therefore less blocked by excessive worry about mechanics and fulfilling the assignment. Most journal prompts, however, are superficial and don't go far enough. They promote egocentric thinking and don't give students an opportunity to think about their present or future place in society. What could be a critical examination of assumptions and values is reduced to a lesson in vagueness and sloppy opinions.

This lesson will enable the teacher to change personal journal writing to critical journal writing. This does not mean that we stop asking students to write about their feelings or experiences. They will still write about these things, but their expression will be clear and thoughtful. In fact, one of the most common refrains of writing teachers is that students do not write in depth. They shift from one topic to another without transitions; they rarely take the time to analyze anything. This "write and flight" syndrome reflects students' thinking processes.

In order to shift to critical journal writing, teachers rewrite existing prompts to include specific questions which will enable students to respond thoughtfully, or teachers write new journal prompts which explore concepts in a critical way. When rewriting a journal prompt, it would be a good idea to adhere to the question form. Students respond more directly to this than statement prompts such as: Write about the part your present family life plays in selecting future goals.

A journal entry, once written, need not be dropped. The teacher could combine the benefits of the freedom of a journal and the thoughtfulness of formal writing by having students later take an entry, expand upon it, analyze it, etc., and turn it into finished formal essay.

Strategies Used to Remodel

These refer to subsections of *Strategy List: 35 Dimensions of Critical Thought*.

- S-12 developing one's perspective: creating or exploring beliefs, arguments, or theories
- S-35 exploring implications and consequences
- S-19 generating or assessing solutions
- S-29 noting significant similarities and differences

- S-20 analyzing or evaluating actions or policies
- S-8 developing intellectual perseverance

Let us use the most blatantly simple of the original prompts as an example: "What you wish..." One can imagine the responses from this prompt: electronic equipment, clothes, cars, expensive houses, good grades, Mary/Mark's love, world peace and that my parents would not get a divorce or would get off my back. It would not be uncommon to find all these things in the same paragraph or the same sentence, with the student thinking that they have adequately completed a journal entry for that day. A response such as this does little to improve the students' writing or thinking skills.

To make this topic a critical journal entry, a teacher could ask the student to respond to this:

What areas in people's lives are within their control? What areas in their lives are they powerless to control? How do decisions made when people are young affect their lives later on? S-35 When should you set future goals? What different types of goals do you have for yourself? Which are most important to you? How would you go about attaining them? Which depend on you alone, and which on others? How many of the goals that you set are material goals? Do you think young people of other countries have different goals? How do they differ? Why do they differ?

The above prompt is intentionally long, but will produce journal entries which are a significant improvement on the laundry wish list.

Next, we will use the prompt "List all the things that are bothering you at this moment" as an example for remodeling:

Daily life is full of stress but seems especially difficult when one is an adolescent. Why do some adolescents seem more emotionally distraught than people who are younger or older? What are some examples of problems in your own life that you have had recently? How did you resolve them? Could they have been resolved in a different or better way? If so, how? S-19

Even such prompts as "If you were an animal, what would you be?" could be improved. But prompts like this are limited and are better used at lower grade levels. If you do use these analogies, then a more critical approach would be: What are your personal characteristics and how did you come to possess those characteristics? Which characteristics are positive and which are negative? If you chose to emphasize your positive characteristics and compare them to an animal, which animal would it be? If you chose to emphasize your negative characteristics, what animal would you compare yourself to? What are some other things, besides animals, you could compare yourself to? How would you justify these comparisons? S-29

Prompts which deal with favorite heroes, movies, and music could be approached in a similar manner. This will help students examine their assumptions and produce more critical responses. "What, exactly do you admire about him or her? How did he or she

acquire those traits? How do you know this person is as you think? What do those who don't admire this person say? Why do they think so? How do they know? How could you find out which is right? Is there something about this person that you don't think you should emulate? What? Why?" S-20

Any journal prompt can be rewritten to reflect critical thinking concepts. Students should be given time to think about their responses before they begin to write. Beware of asking students to complete a critical response in the time it takes you to take attendance. Critical journal entries could be spread out over a period of several days, if you use the daily journal writing format.

An alternative assignment would be to have students use their journal entries as a basis for a more formal and finished essay. Students could expand on their ideas, organize their points, and rewrite rough spots. Students could discuss the ideas in small groups and then write essays. The teacher could give several prompts on related ideas, then have students put their ideas together as a longer, better developed essay. S-8

Writing Argumentative Essays

Objectives of the Remodeled Plan

The Students Will:

- develop their perspectives through dialectical exchange, writing, and argument analysis and evaluation
- clarify issues and key words
- evaluate evidence
- practice critical thought by writing and revising argumentative essays

Standard Approach

Students pick an issue or position and find reasons to support their conclusions. Sometimes students are told to state and refute opposing arguments. They research their topics, noting facts supporting their positions. Sometimes texts introduce fallacies and a bit of logic as preparation. Students write an argumentative essay, defending their positions.

Critique

Though this handbook mainly focuses on incorporating critical thinking into other lessons, lessons specifically on critical thinking can also be useful. Generally, texts' treatment of argumentation suffer from many serious flaws and misunderstandings, display fuzziness of thought, misuse terms, and lack critical insight. As a whole, texts

downplay evaluation of reasoning. (Where mentioned or suggested, they give little guidance and often use confusing language). They rarely suggest evaluating the relevance of support to conclusions.

Texts mainly focus on how to defend opinions, not how to shape them more reasonably. Though they address the importance of giving reasons for beliefs, they often neglect the importance of considering opposing views, or strengthening one's reasoning by weeding out or altering unjustified beliefs. Presenting good reasons, though valuable, is only half of a discussion. The standard approach allows reactions that are too often impressionistic and based on prejudice or lack of understanding.

Rather than teaching argument analysis and evaluation, texts generally have students attempt to distinguish fact from opinion. Though the motive of having students distinguish questionable from acceptable claims is worthwhile, the usual approach does not accomplish this purpose. It produces an unquestioning attitude of acceptance for statements that seem factual, though factual (empirical) claims are not necessarily reliable, and students can't necessarily tell if so-called facts are true. Facts, when used in an argument, may not be complete or relevant. Since statements students are called on to judge as opinions are given without context, students cannot rationally judge whether they are mere whim or can be well defended. Rather than using the fact/opinion distinction, students can distinguish questionable from acceptable claims and fact from interpretation and judgment.

This remodel illustrates a way of orchestrating cognitive strategies to reason dialectically.

Strategies Used to Remodel

These refer to subsections of *Strategy List: 35 Dimensions of Critical Thought*.

- S-26 reasoning dialectically: evaluating perspectives, interpretations, or theories
- S-12 developing one's perspective: creating or exploring beliefs, arguments, or theories
- S-28 thinking precisely about thinking: using critical vocabulary
- S-31 distinguishing relevant from irrelevant facts
- S-34 recognizing contradictions
- S-18 analyzing or evaluating arguments, interpretations, beliefs, or theories
- S-3 exercising fairmindedness
- S-13 clarifying issues, conclusions, or beliefs
- S-15 developing criteria for evaluation: clarifying values and standards
- S-14 clarifying and analyzing the meanings of words or phrases
- S-16 evaluating the credibility of sources of information
- S-33 evaluating evidence and alleged facts

Remodeled Lesson Plan

Introduction

We have written these lessons as a unified unit culminating in a well-thought-out argumentative essay. Similar units, repeated over the course of the year, can greatly improve both reasoning and its expression.

Class discussions can be used to introduce and clarify aspects of critical thought through the analysis and improvement of two opposing arguments selected as models. The models should address the same issue from different perspectives, be fairly strong, but require some improvement. Small group discussions allow students to develop and clarify their positions on issues of their choice, and argue between opposing views.

For their essay and discussion group's topics, students could brainstorm issues of interest to them. Each group must share an issue about which group members disagree. The issues from which they choose should not be questions of mere preference but should call for reasoned judgment. Each student then picks an issue and writes an essay. Students should state their positions and support them with their best reasons. This is the first draft of their argumentative essays. S-12

Beginning Argument Analysis S-28

The teacher might develop students' use of critical vocabulary by having them rephrase the model arguments into explicit premises, assumptions, and conclusions. To have students identify the conclusion of each model, ask, "What is the conclusion? What is the point of the argument? What statement is this argument trying to convince you to believe? Is the conclusion stated or implied?" Then ask, "What reasons are given? Is the reasoning complete, or is there a hidden claim, or assumption?"

Students could then begin to analyze and evaluate the arguments in a class discussion. You could have them give reasons for their evaluations, or guide discussion with questions like the following: "Does it present evidence? What? Are the claims clear? What do they mean? Could they mean something else? Are they ambiguous? Questionable? Complete? What is left out? Is this reason relevant - should it affect our conclusion? Why or why not? S-31

To help students pinpoint the conflict between the model arguments, you might ask, "Do these reasoners disagree about the facts? (Which facts?) Their interpretations of the facts? (On what theories do they base their interpretations?) Do they disagree about values? About how to realize those values? About which of two values is most important?" S-34 Students could suggest ways to make each argument stronger. The teacher may also model improving the arguments and their expression during this and future class discussions. S-18

When assigning discussion groups, emphasize the importance of listening carefully and openmindedly to other arguments. Students can take notes on, and include, opposing views in their essays. Students should argue their positions (that is, give reasons to

convince the others to adopt their conclusions). The groups could note assumptions, pinpoint contradictions, and look for strengths and weaknesses in the arguments given. Each group could recap the main points of their discussion to the entire class. Encourage the groups to find some points of agreement.

You may want to have students argue each other's positions. S-3 Students can then evaluate each other's presentations of their arguments. Have students rewrite their papers.

Clarification

Another lesson could be used to develop students' ability to clarify issues and concepts, again using the model arguments previously mentioned. How would this arguer state the issue? The other arguer? How could we state the issue in words both sides would accept? How could this issue be settled? What concepts do we need to clarify? Is something being evaluated? (What? Why? What standards are most appropriately applied?) S-13

The teacher can have students identify the key terms in the model arguments. Ask students to describe examples to which the key words or phrases in the model arguments would properly apply. Then ask for examples of their opposites. Also ask what phrase could apply to both kinds of cases. Students should then discuss features common to each kind of case, and make the standards they use to judge such cases explicit. S-15 Why is this a case of X? What does the word imply? Why does this arguer characterize the situation as X? S-14

Then each group can meet again to clarify the key claims and terms from their discussion groups. Have students distinguish those terms which all agree apply from disputed terms. They should then clarify the disputed terms or claims by using examples of terms, opposites, and other cases. The standards used for applying the terms or claims should be clarified, the facts required to justify evaluations made explicit.

Evaluating Claims and Evidence

You may want to focus the next section directly on distinguishing claims which need further support from those which are acceptable without further support. You may use questions like the following: Does anyone know whether or not this is true? How do you know? Is there reason to doubt this statement? Why or why not? Accept it? What would support it Undermine it? S-13 Stress that one can't judge truth or reasonableness of a claim from its form or appearance. A statement alone doesn't tell us how much or little thought, or what quality of thought produced it.

For each model, students can evaluate the evidence cited by considering questions like the following: Where did this information come from? How could the source know this? Is this source reliable? (Do they have a good track record? Anything to lose or gain?

Are they in a position to know?) S-16 Is this evidence relevant? Is relevant evidence left out? S-31 Would that evidence require the reasoner to change the conclusion? Why or why not? S-33

Students can then expand and revise their essays. They should give their new positions and arguments, supporting claims which require support. Stress that the strongest arguments take the strengths of other points of view into account. S-12

Students could trade their papers with other members of their groups. Students can comment on the papers requesting clarification or evidence, pointing out where the relevance of claims is unclear, or facts or assumptions are questionable, and correcting distortions of opposing points of view. Students can use the comments when revising their essays. The teacher could have students write group papers, instead of individual papers giving all sides of the disagreement and clarifying points of disagreement.

Insect Anatomy

Objectives of the Remodeled Plan

The Students Will:

- consider their preconceptions about insect anatomy while they build models of insects
- after learning more about insect anatomy, they will rebuild their models to incorporate their new understanding thereby examining, evaluating and modifying their assumptions

Standard Approach

In a brief discussion of insects, texts introduce the structures common to all insects. They name the three main parts of the body and give the number of legs, eyes, antennae.

Critique

Such brief text passages present some simple information about the structure of insects. They give us an opportunity to discuss techniques of science teaching which recognize that students have preconceptions about the subjects we teach. It is important to remember that our students often have ideas about the subjects we are teaching. Students at this level will usually have some preconceptions about insects.

They have ideas about what insects are and are not (most will not identify insects as animals), what they do, how they are built. Here are some important points to consider:

- Children do not come into our classes as "blank slates" ready to receive instruction. Rather, they often have well-developed, but somewhat incorrect, concepts already. These preconceptions strongly affect the understanding children come to when they learn science in school.
- Children's preconceptions are often interesting and creative ways to make sense of the various things children have themselves observed or have been told in or out of school. Children's preconceptions are not "learned" as a single idea, but are constructed in the child's mind as he or she actively tries to make sense of many experiences and pieces of information from both schooling and out-of-school experiences.
- Since these preconceptions often do "make sense" to some degree, especially in the child's viewpoint, it is difficult to change them. Often, we as teachers think, "I said it clearly and correctly. Why didn't they get it?" We forget that children's preconceptions are very resistant to change, and we often need to take an approach designed to help children modify the pre-conceptions they have already constructed.

Since children do come into our classes with their own preconceptions, how can we best teach science so that students form a more accurate and complete understanding of things? In teaching science concepts, we need to adopt a style of teaching somewhat different than we might use for other subject matter. The principles of effective didactic instruction, while sometimes useful when we are teaching information or well-defined skills, aren't the ticket here, because this particular model of instruction doesn't address two necessary features of good science teaching. In science teaching, we must first take into account students' prior knowledge and, second, we must shape instruction so that the students consider what they already know and then become actively involved in modifying their understanding to make it more complete and accurate.

In the lesson on bugs or any other science lesson, we should stress the connection between what the children are learning in school and their everyday experience. There are at least two important reasons for doing this. First, we all hope that school learning can help children understand their everyday lives; this should be one of the main goals of schooling. Often, we try to use this connection to motivate our students to learn. But there is another reason to help students realize that they already have ideas about the science topics they are studying, and this idea is closely related to our discussion of students' preconceptions.

Too often students seemingly compartmentalize their ideas into "school ideas" and "ideas about real life." In order for school science to help students make their views of the world more accurate and complete, we must break down the division between school ideas and real-life ideas. Since much of good science instruction involves helping students refine their preconceptions, it is very important to set up situations

which encourage students to look in their "real life compartment" for their existing ideas on the topics they are studying.

Strategies Used to Remodel

These refer to subsections of *Strategy List: 35 Dimensions of Critical Thought*.

- S-1 thinking independently
- S-30 examining or evaluating assumptions

Remodeled Lesson Plan

Let's look at a lesson on bugs to understand how these ideas might work. While no single example can provide a complete illustration, this lesson on "How Bugs' Bodies Are Built" will give us an example. We should start our lesson with an activity designed to help the students recognize that they already have some ideas on bugs' bodies. While it might work just to have a discussion, there are better ways. In the case of our lesson on bugs, we could begin by having the students build models of bugs in "Mr. Potatohead" fashion. S-1 In doing this, they must recognize and act on their preconceptions about how bugs' bodies are built. For instance, many students might think that bugs have eight legs, and their models would represent this.

After the class built their models (maybe even working in groups in order to share their individual preconceptions socially), the teacher would provide some information about bugs. This could take place in any number of ways, including all the traditional methods of instruction. The "principles of effective didactic instruction" provide helpful ideas for organizing these kinds of informational presentations. Then, following this direct instruction, the students would go back to their bug models, discuss with each other how real bugs differed from their model bugs and perhaps make a new version or modify the old one. By going back to the original model to make corrections, the students will confront their old ideas about bugs. In this active way, their preconceptions about how bugs bodies are built will be changed to be more accurate. S-30