Professor's Notebook

A Resource for STEM Faculty
in the College of Arts and Humanities
and the College of Engineering
at
Tennessee State University

Marino C. Alvarez
Tennessee State University
malvarez@coe.tsuniv.edu

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Professor's Notebook

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FOREWORD

The intent of this *Professor's Notebook* is to share methods and strategies that are evolving from faculty development sessions with STEM faculty in the College of Arts and Humanities and the College of Engineering. The impetus for this notebook arises from an NSF funding grant awarded to Tennessee State University, HBCU-UP, for faculty and students in the STEM classes. This resource is viewed as an organic document that contains examples of teaching and learning methods and practices that are being developed and used by this faculty and their students.

This *Professor's Notebook* is an *organic document* that evolves from our faculty development sessions and their use by faculty with their students. Examples developed and used by STEM faculty in this project are included to demonstrate how these instructional strategies can be developed and shared with students.

CONTRIBUTORS

Faculty members who have contributed to this version are:

Orville Bignall, College of Arts and Sciences, physics

Michael R. Busby, College of Engineering, thermodynamics.

Joshua Moore, College of Arts and Sciences, chemistry

Michael Reed. College of Arts and Sciences, mathematics.

Tamara Rogers, College of Engineering, computer science

Sachin Shetty, College of Engineering, computer programming

What about this?

As you try different strategies, techniques, methods, or procedures that are successful with your students, share them by sending examples or sample lessons to:

Dee Green, Coordinator for HBCU-UP
dgreen10@tnstate.edu

These example or sample lessons will be included in the next Notebook update.

CHAPTER 1
INTRODUCTION

For every student with a spark of genius
there are a dozen with ignition trouble!
- Author Unknown

This version of the *Professor's Notebook for STEM Faculty* is an open-ended notebook to view different ways of getting students actively involved with a lesson. This notebook is not intended to be "preachy," definitive, absolute, or all-inclusive. Its purpose is to elicit responses to these and other methods that can be used to better serve our students. Included are strategies that professors can use with their students, and strategies that can be shown and demonstrated to students to use for themselves.[1]

Contained in this version are those methods and strategies that have been demonstrated and discussed in our STEM faculty development sessions. As we continue with these sessions more of these methods and strategies will be added to this *Notebook*. Forthcoming will be descriptions and examples that include: Preparing Students To Learn By Listening; Thinking It Through; The IDEAL Problem Solver; Writing Summaries; Learning Through Cases and Case-Based Instruction and Learning.

As members of the STEM faculty, it is important for our undergraduate and graduate students to see practices modeled and demonstrated by their professors. If their only exposure to class is primarily lecture, most likely, they will resort to relying on rote memorization and formulaic applications of mathematical and science principles with minimal understanding and application of this newly acquired knowledge. Of more importance is that students are able to not only know information, but to be able to understand and apply newly information to problem-oriented real life situations.

The Exploring Minds Network designed at the Center of Excellence for Information Systems, Tennessee State University, is described in Chapter 6. Included in this network are management systems, concept maps and interactive **V** diagrams that can be constructed and shared electronically. If you are interested in using this system with your students contact me.

Use this *Notebook* as you normally do with such a device. Write your thoughts, make adaptations, modifications, and record what is and is not effective with your students.

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[1]This notebook is a collection of ideas and materials written by the author and, in some instances, with Robert C. Aukerman.

Active Versus Passive Student Class Participation

Think about when you were a student sitting in college classrooms. What did you find more enjoyable: listening and writing notes, or participating? It is reasonable to assume that band members learn their formations by practicing them. Athletes learn their offensive and defensive plays by practicing them in "realistic" settings on the practice field, court, or arena. What if the Band Director called the members to the field and "talked" to them about the formations during each practice period without ever having them actively go through the procedures? What if the coach "talked" to the players on the field or court day after day without having them physically participate in the practice session? How effective would the band perform on game day? What about the players? The point is that "talking" about what to do, and having the students do it are two different games. It may take more "time," but learning more with less by "teaching" the content and having students actively involved in the lessons may be more effective than learning less with more by "covering" the content and having the students passively sitting at their desks. What do you think? How do you actively involve your students in class activities?

(Here's a place to write your comments)

Lecture: Positive and Negative Points

Lecturing is the primary mode of presenting information to students at the college level. It is a good way to get information to students. It takes less time than involving students in actual projects, discussions, or simulations. The information presented is under the control of the professor. Points are presented in a one-way voice. Little deviation from the objectives of the lesson occurs. Coupled with illustrative examples (e.g., overhead visuals, charts, maps, graphs, etc.) the lecture is enhanced.

Is it effective? It depends on when, how often, and what kind of lecturing takes place. For example, a lecture urging students to be better informed about using technology in the workplace will not involve them as much as an activity in which they actually use the technology. A film or video presentation of a situation that demonstrates the process of using acrylics will not involve students as much as their actually using acrylics to develop a portrait. Students are subjected to mass dosages of information from which they are to "learn" and "understand." They are expected to "learn" this information and give it back when asked on a test. In many instances, this kind of dispensation by the professor and receiving by the student in a passive way leads to "borrowed knowledge." This condition exists when students "borrow" the information from the professor by memorizing it for a test, and then gives this "knowledge" back when the examination is given. If one were to ask these students what they had learned several days or weeks later, they may have difficulty telling you.

If one lectures all or most of the time to students, their information tends to be text bound. That is information appearing in the text is reiterated to the students in oral discourse. Student attention is at best "minimal." In situations where students are "talked to" all or most of the time rote memorization is encouraged and critical or imaginative thinking diminishes. Students come to realize that what is expected are "right" answers. Comprehension takes a back seat to factual acquisition.

In classes where lecture is the dominating method of teaching, problem-solving skills, transfer of knowledge to new situations, motivation for further learning, retention of knowledge, and student satisfaction with the course are primary shortcomings.

> *"Hey, I'm not like that! I organize my lectures by updating my notes each semester. Before each class, I write a lecture that takes into consideration what readings or problems were assigned; how they are presented in their textbook; and, enhance the lesson by using analogies and viewpoints that supplement their assignments. My students are spellbound I can look into their faces and see them anxiously waiting for the next phrase of my talk. From the moment I began to lecture until the period is over, my students are attentive. I often hear spontaneous outcries like 'Good point professor' 'Great idea!' 'Wow!' 'Repeat that again!' "Can I call you for a follow-up point?' There's no reading the newspaper, putting their heads down on my desk, staring*

out the window, or doodling going on in my class. After my classes students compliment me and ask questions."

If this scenario is commonplace for you, then lecture may be a viable and effective mode of getting your students to learn. However, if not, you may want to think about ways that can actively involve your students in lessons and assignments that supplement the lecture.

Hands-On Activities

Hands-on activities encourage group interaction and collaborative learning. Hands-on activities are not restricted to those subject areas such as art, music, health and physical education. Subjects such as English, Foreign Languages, Political Science, Special Education, Mathematics, Psychology, Science, Educational Administration, Speech Communications, Business Education, and others are also favorable to hands-on activities. We may think of ways that involve our students to learn content that appeal to various learning modalities: visual, auditory, tactile, and kinesthetic. Engaging students in these hands-on activities provides them with experiences in contexts that enable them to better understand the facts and ideas of the text and supplemental materials.

Students can be shown examples of problems as they apply to "realistic" settings and given situations, cases, simulations, diagnostic kits, architectural drawings, and schematics. Students can develop and construct example documents, mathematical, chemical and engineering applications, technology programs, practical exercises, and so forth.

Chapter 2
Preparing the Reader for the Text

Preparation: "Stage-setting" and Predicting

The prereading strategies that follow are intended to provide a framework for classroom teachers to follow in *preparing* students to engage with the text and/or other reading materials.

Preparing the Reader for the Text

Among others, there are two activities that have been effective in *preparing* students for a topic or unit of study by setting the state for learning. They are described in the following order:

Curiosity arousers

Visual Literacy Guide

Curiosity arousers were developed by Scott Shablak and Richard Castallo.2 They are intended to direct learners to think rather than merely search for information. The mental activity that they are designed to stimulate should be in an area that is very relevant to the learners, otherwise it becomes a phoney, sham exercise in pretending to be curious just to satisfy the teacher. To a large extent, therefore, curiosity arousers should be generated by pupils and teachers cooperatively, unless the teacher is very sure of the interests and concerns of the students.

Curiosity is a prime motivator. All of us are anxious to discover if our predictions are correct. Our curiosity may be piqued by a teasing question or problem that involves searching through journals, museums, or old relics. If a question or problem conflicts with our mind set, we are spurred to resolve this conflict by utilizing prior knowledge and experiences in the problem solving task.

2Scott L. Shablak and Richard Castallo. Curiosity arousal and motivation in the teaching/learning process (pp. 51-65). In H.L. Herber and R.T. Vacca (Eds.), Research in Reading in the Content Areas: Third Report. Syracuse, New York, Reading and Language Arts Center, Syracuse University, 1977.

A popular method is to present a situation to the students and have them "brainstorm" their thoughts. For example:

> You are driving on a lonely deserted mountain road and you feel that sagging sensation on the left side of the front of the automobile. You hear that unwanted sound of the tire flapping against the rim. Pulling over to the embankment just five feet from the right edge of your car. You begin changing the flat tire. You struggle to loosen the lug nuts that you're sure someone welded. Carefully you place the jack in its proper position and raise the car. Upon removing all of the lug nuts, you replace the flattened tire with the spare one. In your haste to grab the lug nuts, you inadvertently kick them over the shear 100 foot embankment into the river below. What do you do now?

Give this situation some careful thought. What would you predict if you were in this unfortunate situation? How would you solve this dilemma? Would you wait for a passerby knowing it may be hours or days? If so, could this passerby help? Is there a reasonable solution to this problem? A creative person may take one lug nut from each of the other three wheels and use them to secure the spare tire until a service station or nearby parts store could be reached. Simple enough, once we know an answer.

Problem situations can be presented to students that will motivate them to find a solution that satisfies their curiosity. Before reading a mystery story, wouldn't the reader be anxious to begin if presented with some tantalizing situations and asked to make some predictions based on these statements? Or, before embarking upon a chemistry experiment, you could present situations in which similar chemicals were used to create a volatile solution and ask them to make predictions about the consequences of such a mixture?

STEM Faculty Curiosity Arousers.

Dr. Michael Reed, a mathematics professor, developed this curiosity arouser to use with his calculus students.

Curiosity Arouser for Calculus

> What kinds of things do you know that can be used to approximate? Approximation is an important technique, both in the \real world" and in Mathematics. The area of Calculus is very highly related to approximations. In fact, most methods of Calculus boil down to the following: \We often have a quantity that we want to calculate but can't due to some type of difficulty. So, what do we do? Approximate!! -with something we do know how to calculate." This is the basis of everything that is done in Calculus I.
>
> Suppose that we have a line with one point on the line ($x1; y1$) and we want to calculate the slope of the line. Can this be done directly (without Calculus)? Why or why not? What do we know how to calculate that is similar to this problem?
>
> Suppose that we have a “rectangular" figure with one curvy side. Can we calculate the area of this figure directly (without Calculus)? Why or why not? What do we know how to calculate that is similar to this problem?
>
> Our initial approximation may or may not be very good. The next question might be: “How do we make our approximation better and better?" Can we then use this information to find the exact value we were seeking to begin with? How? This is the main idea of Calculus I.

Dr. Tamara Rogers developed this curiosity arouser to use with her undergraduates in Computer Technology:

Curiosity Arouser:

Violent offense records, birth date, shoe size, favorite color, last boyfriend/girlfriend’s name, health records, favorite movie, school records/transcript

What would you like to know about people you deal with?

- Family members?
- Student's teachers?
- Grocery store clerk?
- Blind date?

Curiosity Arouser for Biology

Dr. Josh Moore a professor of biology created this curiosity arouser for his undergraduate students:

> What do a feather, bowling ball, a coin, water, and air all have in common?? They are examples of matter! But if they're all matter, how do we tell them apart? Looking around, there is matter all around us…it's everywhere. The modern definition of matter is anything that has mass and takes up space.
>
> Empedocles, and early Greek philosopher, was the first to propose a theory to describe the things around us. His theory stated that all matter was made up of four elements: fire, air, water, and earth. Later philosophers and great thinkers tried to expand on Empedocles' original theory eventually coming to the idea that all matter was made up of infinitesimally small pieces of matter called atoms.
>
> Matter is one of the central concepts in the study of chemistry: understanding matter as we see it and as we cannot see it (*i.e.* atoms), and its properties and reactions.

Developing Visual Literacy Guides

The steps in preparing a visual literacy study guide are as follows:

1. Select a visual aid either appearing in a textbook or one that can be use to clarify an assigned reading passage. Make a transparency of this visual.

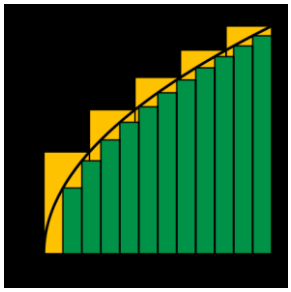
2. List some of the items that appear in the visual. This involves the literal mode of reading comprehension. Add distractors to avoid students simply checking all of the items. Ask students to add other items they see in the visual.

3. Select words or terms that the visual expresses. This is usually in the form of an idea, expression, emotion, and so forth. This allows the student to use prior knowledge and background experiences to make interpretations of the visual. Ask students to add other words or phrases that the visual makes them think of.

4. Write statements in the interpretive modes of reading comprehension in a effort to engage the student with the visual and the forthcoming reading.

After several uses with this type of visual literacy study guide with the class, you may wish to have them construct their own. This can be accomplished by either using a visual in the textbook or supplying them with one designed to explain an assigned reading. In reviewing these student constructions, the teacher is able to see how well they perceive and understand the content.

This visual literacy guide was developed by Dr. Michael Reed a mathematics professor.



Part1: Directions: Place a check mark before the words you see (concepts) that apply to this graph:

____ curve _____rectangle _____ approximate _____ under

_____ over _____ area _____ sum

Add others that you see: _____ _____ _____

Part2: Directions: Place a check mark before the words (concepts) that the graph makes you think of. Add others that you think about that are related to the graph.

_____ difficult _____ Isaac Newton _____ Georg Liebniz

_____ music _____ Calculus _____ useful

Your ideas:

_____ _____ _____

The following visual literacy guide was developed by Dr. Tamara Rogers for her computer technology class:

Visual Literacy Guide

Purpose: To identify the issues related to privacy.

Part 1: Directions: Place a check mark before the words you see (concepts) that apply to this picture:

_____ privacy	_____ identity	_____ ownership
_____ network	_____ rigging	_____ health
_____ tail	_____ space	_____ kite

Add others that you see

_____ _____

Part 2: Directions: Place a check mark before the words (concepts) that the picture makes you think of. Add others that you think about that are related to the picture.

_____ disclosure	_____ safety	_____ Facebook
_____ innocence	_____ pictures	_____ mishap

Your ideas:

_____	_____	_____
_____	_____	_____

Part 3: Place a check before the statements that you believe tell about the picture. **Add one statement that you can support**.

_____ 1. Privacy is reduced.

_____ 2. Newspapers report facts about individuals.

_____ 3. Cameras see everything.

_____ 4. Innocent people have nothing to hide.

Write your statement:

_____

Dr. Josh Moore a professor of biology developed this visual literacy guide:

Visual Literacy Guide

INSERT IMAGE HERE

Purpose: To identify the key concepts needed to understand matter

Part 1: Directions: Place a check mark before the words you see (concepts) that apply to this picture.

_____scale _____pans _____weights _____mass

_____gravity _____atoms _____strings

Add others that you see:

_____ _____

Part 2: Directions: Place a check mark before the words (concepts) that the picture makes you think of. Add others that you think are related to the picture.

_____scientific instrument _____atoms _____Easter

_____John Dalton _____Physics _____justice

Your Ideas:

_____ _____ _____ _____

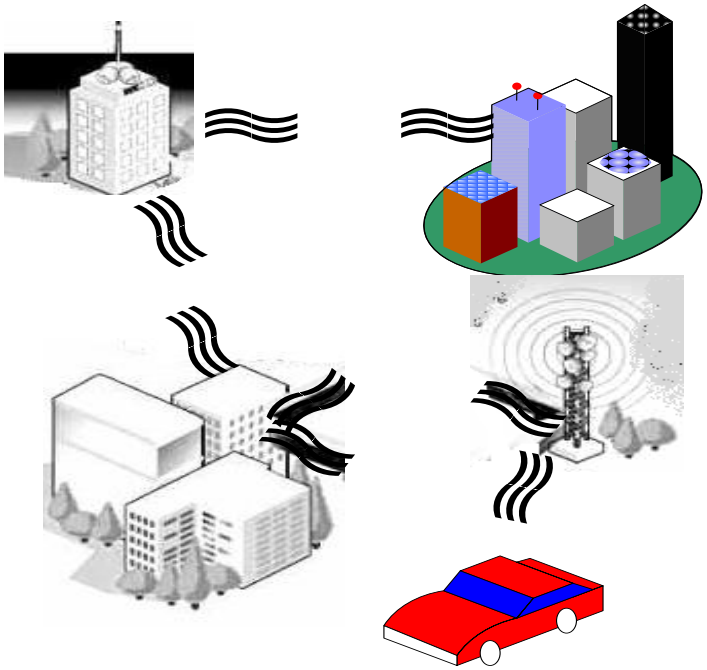
Theme-Based Curiosity Arouser, Visual Literacy Guide, and Reading/Study Guide

The following theme-based curiosity arouser, visual literacy and ready/study guide was used by Dr. Sachin Shetty in an engineering class to draw attention to the illustrations that introduced random noise.

Curiosity arouser

You have a habit of listening to the FM radio in your car while driving from to home to school and back. Most of the days, you hear crystal clear sound. But during some days or while driving through certain areas, you observe loss of sound or sound filled with varying amount of "static noise".
What do you think is the reason for this abnormal situation (loss of sound or static noise)? What is/are the sources for this problem? Can we predict how many times a day your radio experiences this problem? How would you write a computer program to simulate this scenario on your computer?

Visual Literacy Guide



Purpose: To identify and understand the principles of random noise added to radio signal

Part 1: Directions: Place a check mark before the words you see (concepts) that apply to this picture:

_____ Building _____ car _____ radio station

_____ Trees _____ signal _____ radio transmitter

_____ wind _____ noise _____ street

Add others that you see

_____ _____

Part 2: Directions: Place a check mark before the words (concepts) that the picture makes you think of. Add others that you think about that are related to the picture.

_____ Marconi _____ Static Noise _____ FM Radio

_____ aerial photograph _____ interference _____ weak signal

Your ideas:

_____ _____

_____ _____

_____ _____

Part 3: Place a check before the statements that you believe tell about the picture. **Add one statement that you can support**.

_____ 1. To listen to crystal clear music, car should not be driven through thick foliage surrounding the roads.

_____ 2. Having more radio transmitters will decrease static noise overpowering radio signal.

_____ 3. Highway is better than backroads.

_____ 4. Having radio transmitters closer to highways are better.

_____ 5. The same principles involved in noise added to radio signals are similar to noise added to signals between air traffic controllers and pilots in planes.

Write your statement:

_____

Reading/study guide

Literal Level: *What does the author say?*

Directions: Read the statements and place a check mark in front of those that the presents information found in the passages on "Jamming." Be sure to provide evidence from the text to support your decisions.

____1. Jamming of signals was an effective way of sabotaging commercial broadcast transmission.
____2. You don't have to be physically close to the transmitter to jam the signals.

____3. It was important that commercial broadcasting stations are robust to jamming.

____4. Over one-third of the seven HF frequency bands reserved for broadcasting between 6 and 21 MHz were unusable for following almost whatever transmission because of jamming.

Directions: Place a check mark in front of each statement that can be supported by the combinations of information found in the passages. Be sure to provide evidence to support your decisions.

Interpretive Level: *What does the author mean?*

____5. Jamming of commercial radio stations have been taking place for most of the last century.

____6. It is relatively easy to take down significant number of channels allocated to radio stations.

____7. Real time identification of jammers is a significantly tough task.

____8. The untethered mode of communication makes it easy to jam radio signals.

Directions: Place a check mark before each statement that you can support with ideas derived from the passages and from your own knowledge and experience. Be able to provide evidence from both sources to support your decisions.

Applied Level: *How can we use these meanings?*

____9. Radio stations should be able to quickly detect onset of jamming and adapt accordingly
___10. Jammers should be subject to strict legal actions
___11. Hard problems like jamming should be solved with simple engineering solutions.

Reading Passage:

Jamming, or deliberate interference against radio broadcasting stations
by V. K. Lehtoranta

As suggested by the title, this article discusses jamming of radio transmissions that were targeted to ordinary people. At one point of time, over 99 % of jamming originated from the areas of the ex-Soviet Union's sphere of influence.

The topics such as military operations and deliberate interference against commercial stations will be left outside the discussion here. The first case of the latter topic may be from the times of the revolution when Reichswehr with its 5-kW transmitter in Berlin jammed the telegraphy communications between Paris and Sankt Petersburg, Russia. When the Soviet Union in the end of 1988 still managed to stop the massive jamming operation /1/ that lasted for over 40 years, even the most casual listener could sense the odd silence that had fallen over the HF broadcasting bands. For instance, a study made in Helsinki in April 1988 showed that, on the average, over one-third of the seven HF frequency bands reserved for broadcasting between 6 and 21 MHz were unusable for following almost whatever transmission because of jamming. After the Gulf War in the beginning of 1991, the HF or MW jamming stations that could still be heard here were operating primarily in the Middle East. In the summer of 1996, the World Jamming Club announced that actual jamming stations were still operational in the following countries: China, Cuba, Iran, Myanmar, North Korea, Vietnam and Turkey (TV). The target for Turkish jamming was the satellite transmissions of Kurdish Med-TV (Eutelsat ECS II F2, transponder 25). Jamming has been observed at least in the autumn of 1997 and in 1998, and it has been asserted that it originated from the Sinop uplink station on the coast of the Black Sea. Issues related to deliberate jamming were naturally discussed in almost every important UN session and in international post-war radio conferences. For instance, after the complaints made by USA to the ITU, the UN General Assembly condemned deliberate jamming by 49 votes to 5 on 14

December 1950. Even in the 1982 ITU conference in Nairobi, Czechoslovakia (perhaps by order) made a proposal on legalization of jamming. During the years between 1984 and 1986 IFRB, by order of the ITU, organized a survey on deliberate jamming in four three-week periods. The operation was attended by more than 30 monitoring stations around the world with some kind of DF capability. In addition to the ordinary parameters, the morse ident (ID) of and the obtained bearing to the jamming stations were recorded.

The monitoring results, besides the ITU's own documents, have been discussed in the note /2/, the supplemental maps of which reveal the commonly-known considerable inaccuracy of the HF DF systems. Although the DF system itself would be almost ideal (in this particular case they were not), the HF wave does not always propagate along the great-circle path, especially in long

distances. Furthermore, when many stations (even jamming stations) were usually "one on the other", distinguishing them from each other mostly failed.

CHAPTER 3
ORGANIZING AND CLARIFYING IDEAS

Concept Mapping

A hierarchical concept map is a visual representation of an individual's thought processes. It is a word diagram that is portrayed visually in a hierarchical fashion and represents concepts and their relationships. Concept maps can be used by professors and students.

*By a **professor** to:*

1. Plan and organize a lesson from a text or supplementary reading.
2. Present a preview to the class of the key ideas of a forthcoming reading.
3. Clarify conceptual ambiguities appearing in assigned readings.
4. Evaluate students' knowledge of the ideas contained in a chapter or unit of study.
5. Share ideas with an individual and/or group of students.

*By a **student** to:*

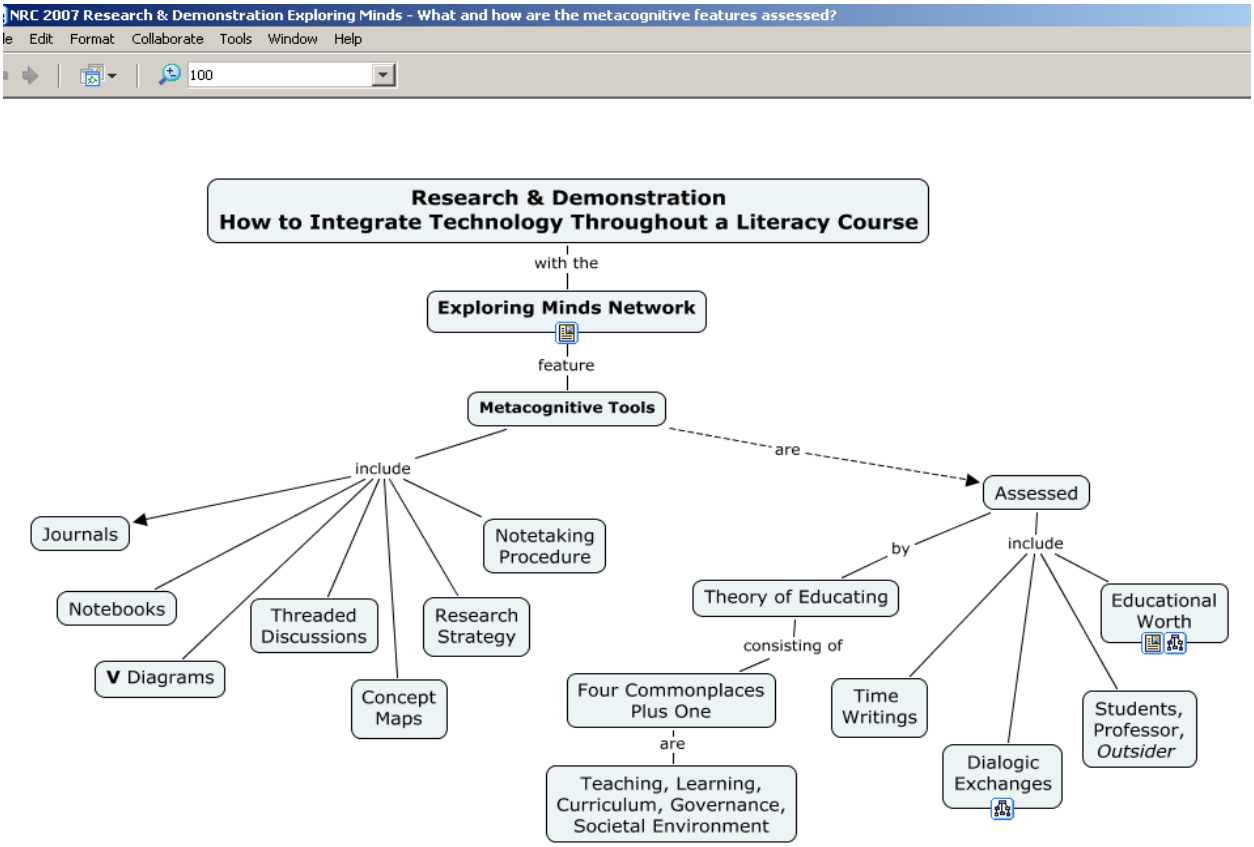
1. Map textbook passages that contain important fact and ideas.
2. Clarify portions of a text that are unclear or difficult to grasp.
3. Take notes from a lecture.
4. Plan a paper or writing assignment.
5. Prepare for an oral presentation.
6. Review for an examination.
7. Share and communicate ideas with a professor and/or with peers.

Both the professor and students need to have a starting place from which to facilitate the process of relating new information to prior knowledge and experience and to share these ideas. Concept maps provide a starting point from which to determine what the learner already knows about a given topic and what needs to be learned. For example, by asking a student to make a concept map of a topic that is about to be studied, the professor is able to determine: (1) the students' general knowledge with the topic; (2) how the student perceives the topic; and (3) if there are any misconceptions the student may have about the topic to be studied. Likewise, the concept mapping procedure can be used by the professor to see how well students have comprehended the key ideas studied during previous lessons.

A concept map shows the interrelationship between ideas, facts, and details. A

hierarchical concept map progresses from most inclusive (general) ideas to least inclusive (specific) ones. Figure 3.1 is an example of a hierarchical concept map constructed to introduce a unit on the "How to Integrate Technology Throughout a Literacy Course."

Figure 3.1. A hierarchical concept map displaying an overview of research and with technology in a literacy course.



In this map (see Figure 3.1) ideas are linked by labeled lines that contain either a word or word phrase to show their relationship. This is referred to as a *proposition*. Propositions are meaningful relationships between concepts and are expressed by a connecting line and linking word(s). Once the student has constructed a map, writing about the visual display is an easy task due to the labeling and linking of the ideas in the arrangement. Better comprehension of the concept (i.e., methods of research) is achieved. Expanded propositional statements give greater meaning to a concept.

NOTICE also that there are icons attached to this map. In our HBCU-UP Project we use CmapTools software to develop and share maps electronically. This map was constructed using

CMap Tools a software program that can be downloaded without cost for use in educational settings http://cmap.ihmc.us/download/ For example, clicking on the icon under *Exploring Minds Network* takes the viewer to this Internet site. Likewise, clicking on the icon under *Educational Worth* takes the viewer to a submap of this topic or to a document that explains this concept.

Introducing Concept Mapping

There are three key terms that need to be explained to students before they begin concept mapping. These are *concepts*, *events*, and *objects*. A *concept* is a sign or symbol that points to a regularity in events or objects (Alvarez & Gowin, 2010; Gowin & Alvarez, 2005). Concepts are usually identified by words, but they may be numerical or symbolic (such as musical notations, mathematical symbols, and chemical formulas). *Events* are defined as anything that happens or can be made to happen, or is in the realm of possibility to happen. These events can be natural (e.g., thundershower, tornado, volcanic eruption) or can be made to happen (e.g., soccer match, university play, art exhibit, orchestra recital, faculty meeting). *Objects* are defined as anything that exists and can be observed. For example, birds, snow, mountains, and volcanoes are naturally occurring objects; sculptures, books, bridges, and robots are objects that humans construct. *Facts* are records of events.

Joseph Novak and Bob Gowin suggest the following procedures to introduce concept mapping with your students:

1. Make two lists of words on the chalkboard or overhead projector using a list of familiar words for objects and another list for events. For example, *object* words might be "building," plate," "tree," "star." *Event* words could include running, thinking, fire, meeting. Ask the students if they can describe how the two lists differ. Help them recognize that the first list is things or objects and the second list is happenings or events. Label the two lists.

2. Ask the students to describe what they think of when they see or hear the word "building," "plate," "tree," etc. (This will elicit divergent responses). Help students to recognize that even though we use the same words, each of us may think of something a little different. These *mental images* we have for words are our concepts. (Introduce the word concept.)

3. Repeat the procedure in step 2 using *event* words. Be sure to distinguish our mental images, or concepts, of these events. Point out that one reason we have trouble understanding each other sometimes is that our concepts are never exactly the same even though we know the same words. Words are labels for concepts, but each of us must acquire our own meanings for words.

4. List words such as "is," "can be," "are," "if," "then," "such as," "with." Ask the students what they think of when they see or hear each of these words. Explain to them that these are not

concept words - they are *linking words*. These linking words are used when we are speaking and writing. Linking words are used with concept words to construct sentences that have meaning.

5. Proper nouns are not concept words. They are names of specific people, events, places, or objects. Use some examples that help students to see the distinction between labels for regularities in events or objects and those for specific events or objects (or proper nouns).

6. Using two concept words and linking word(s), construct a few short sentences on the chalkboard or overhead projector to illustrate how concept words plus linking words are used by people to convey meanings. Examples would be: "The tree is on fire!" or "The umpires are meeting at home plate."

7. Ask students to construct a few short sentences on their own. Ask them to identify the concept words and tell whether each is an *object* or an *event*. Ask them to also identify the *linking* words.

8. If you have bilingual students in the class, have them present some foreign words that label the same events or objects. Help them to recognize that language does not make the concept, but only serves as the label we use for the concept.

9. Introduce some short words to the class such as "dire," "terse," or "canis." These are words that stand for concepts they already know, but have somewhat special meaning. Help students to see that meanings of concepts are not rigid and fixed, but can grow and change as we learn more.

Making a Concept Map

Concept maps can be constructed to map a textual passage or to map ideas for written or oral presentations (see Alvarez and Gowin, The Little Book: Conceptual Elements of Research, Lanham, MD: Rowman & Littlefield, 2010; Gowin and Alvarez, *The Art of Educating with V Diagrams*, New York and Cambridge UK: Cambridge University Press, 2005).

Mapping a text

The procedure for mapping a text can be divided into eight main steps: ***read***, ***select***, ***re-read***, ***rank***, ***arrange***, ***link***, ***review***, and ***write***.

1. **Read** the passage with the intention of trying to understand as much as possible from the reading. (The professor should use a short passage when first demonstrating this mapping technique.)

2. **Select** the purpose for mapping. Determine the major focus or theme in the reading passage. Write this theme on the top-center of your paper. This is the major idea to which the other concepts can be related and subsumed.

3. **Reread** the passage. Once the major focus or theme has been identified, circle the key words and phrases in your text. Make a listing of each of these concepts on a sheet of paper.

4. **Rank** the concepts from most inclusive (general) to least inclusive (concrete and specific). This process aids in establishing a hierarchical structure for the information contained in the reading passage and for our arrangement on the map.

5. **Arrange** the concept words on your paper according to hierarchical structure and relationship. For example, concepts that can be subsumed and/or related to each other.

6. **Link** the concept words by drawing lines showing the connections among and between the ideas. Label each line using a word or word phrase to explain the relationships. If an idea relates to others that have already been represented in another portion of the map, show the relationship of this idea by drawing a broken line to indicate ***cross linkage***.

7. **Review** your concept map. Look again at your concept map. Can you add any other information to the map that is not given in the reading passage? Can you think of another way that this map can be arranged to give a better understanding of the ideas?

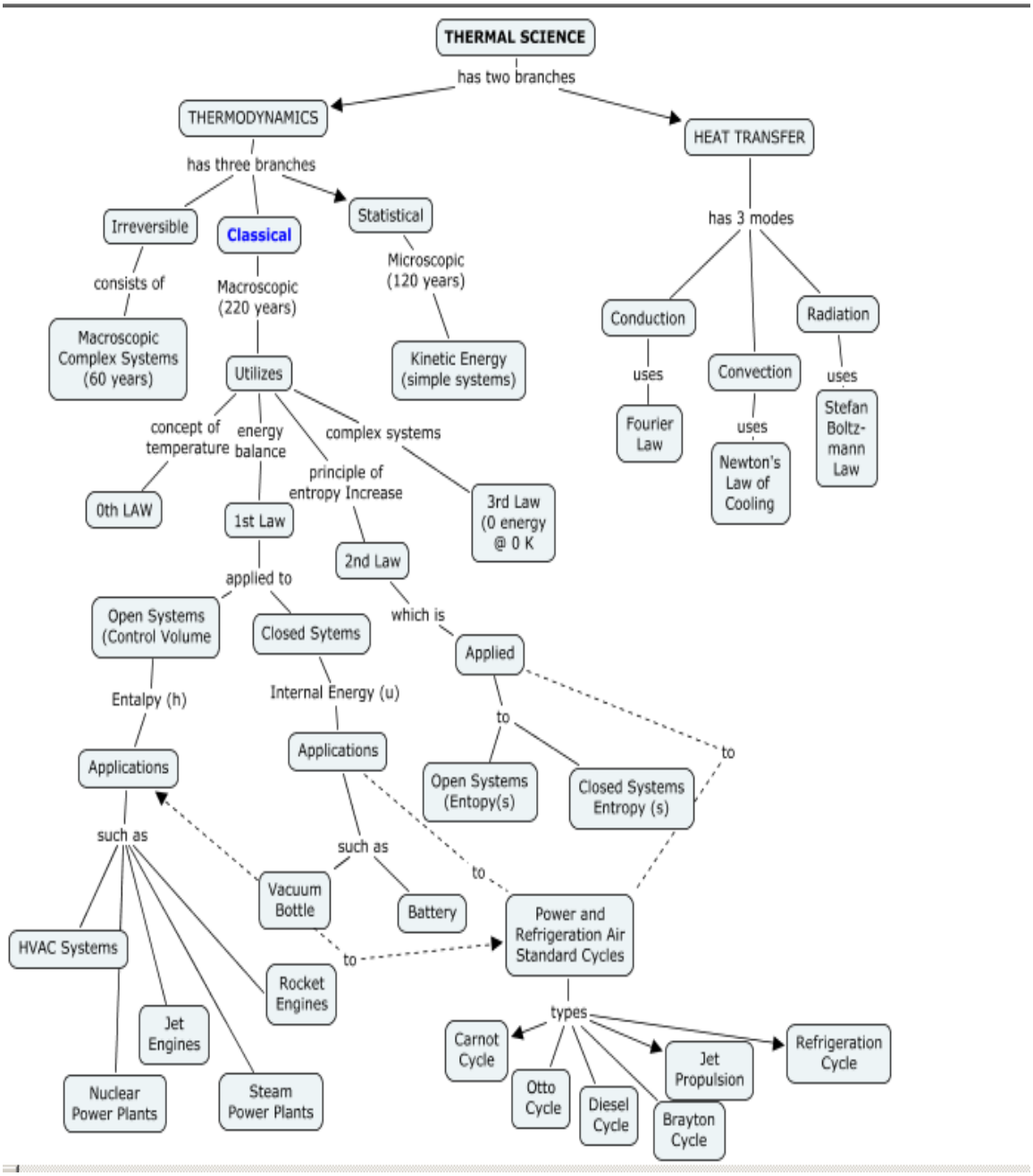
8. **Write** a paragraph(s) describing the conceptual arrangement of the map. This is a relatively easy process since the map is now organized into coherent and unified threads evolving from a focus or theme.

Students can draw the maps by hand or they can electronically create their maps using CMap Tools http://cmap.ihmc.us/ which is a free download for educational use only.

Example of introducing a thermodynamics class to the components of Thermal Science.

Michael Busby, a professor of engineering, uses this concept map to introduce his students to the concepts that they will be learning in his thermodynamics class (see Figure 3.2).

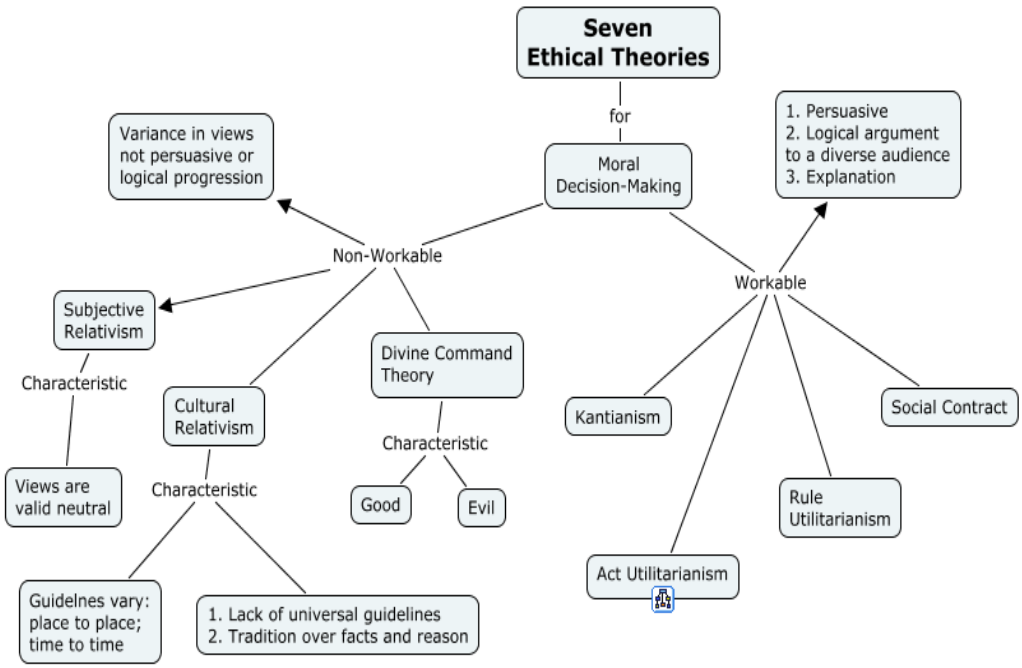
Figure 3.2. Hierarchical Concept Map for Thermodynamics.



An Example for Computer Science

Tamara Rogers, a professor of computer science, introduces her class to a unit on "Ethics." Below is a concept map shown in Figure 3.3 depicting seven principles.

Figure 3.3. Introducing the class to seven principles of Ethics.



1. The unit entitled "Ethics" is **read** for comprehension of the major ideas, facts, and details.

2. A theme is **selected, i**n this case seven principles of Ethics are depicted, to which the other ideas of the passage can be related.

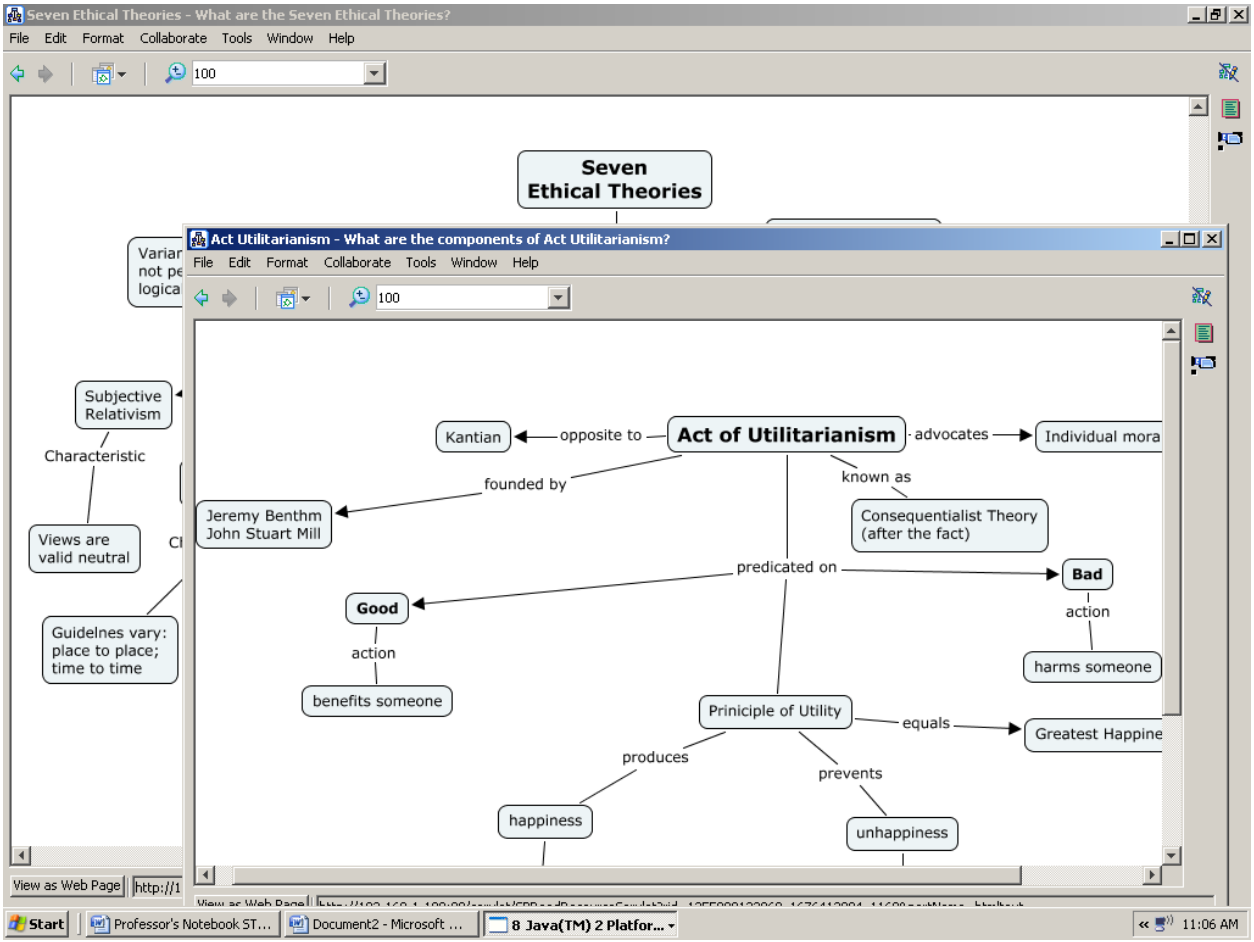
3. The passage is **reread** this time circling the key words and phrases relating to the selected theme. Each concept word and phrase is listed on a sheet of paper.

4. The key concepts are **ranked** hierarchically from most to least inclusive. This is done by first taking one major idea and subsuming those ideas that relate to it and then proceeding to the next major idea subsuming those related ideas, and so forth.

5. The key concepts are **arranged** according to the ranking and **linked** by drawing and labeling the lines with a word or word phrase to explain their relationship.

NOTICE on this map appear icons that take the view directly to hyperlinks of documents and to other sub concept maps that elaborate on one of the seven principles. For example, clicking on the icon under Act of Utilitarianism reveals this submap (see figure 3.4).

Figure 3.4. A submap elaborating on Act of Utilitarianism.



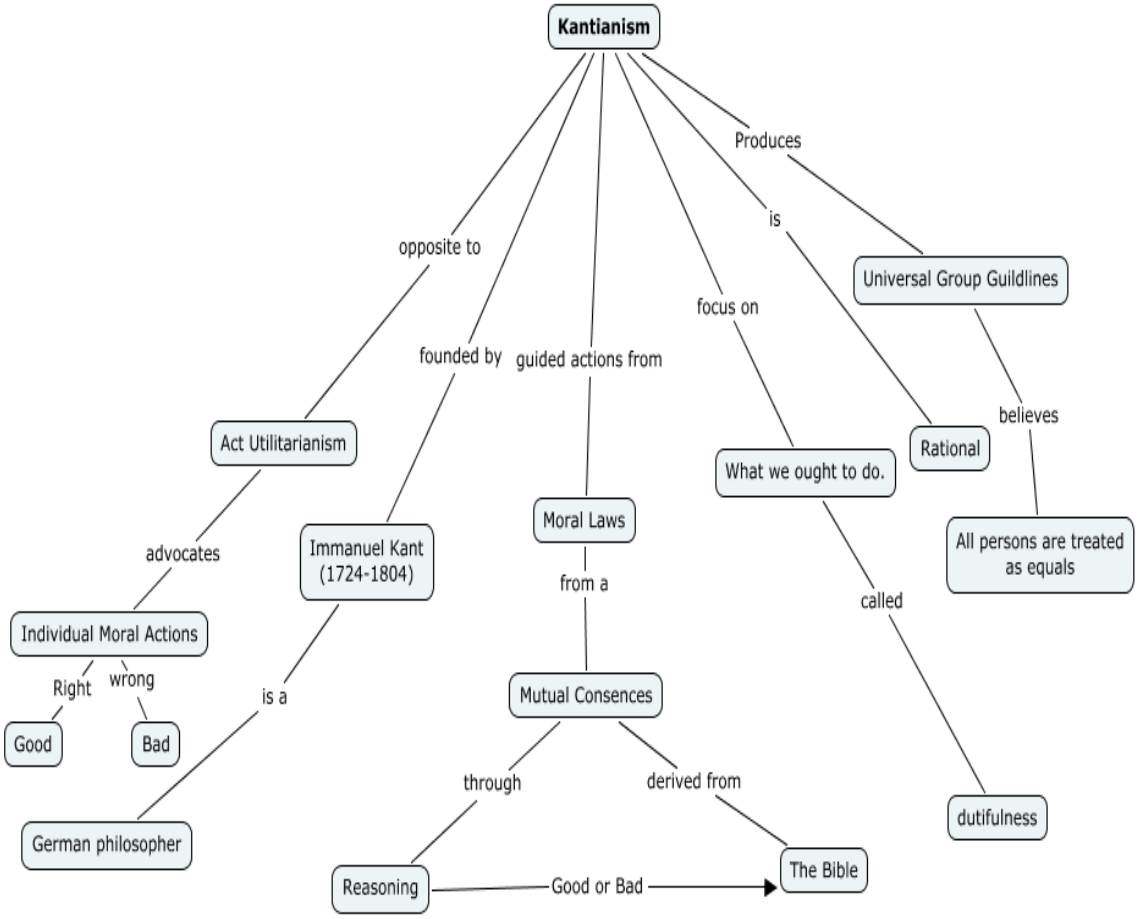
6. At this point, the map is **reviewed**. Any other information not mentioned in the passage that is known to relate to the ideas in the text is inserted on the map. If the map can be represented in a better organized visual scheme it is reconstructed. This reconstruction of the map allows the individual to rethink ideas and process the information in a meaningful way rather than through rote memorization of names, dates, facts, and details.

7. Using the conceptual arrangement of the map as a guide, a paragraph(s) is **written** that includes the major ideas of the passage together with the other ideas inserted by the developer. This is an easy process since the map contains ideas that are connected to each other with labeled lines.

Student Homework Example.

Students were asked to develop a concept map on each of these seven principles. Shown in Figure 3.5 is one student's map representing Kantianism.

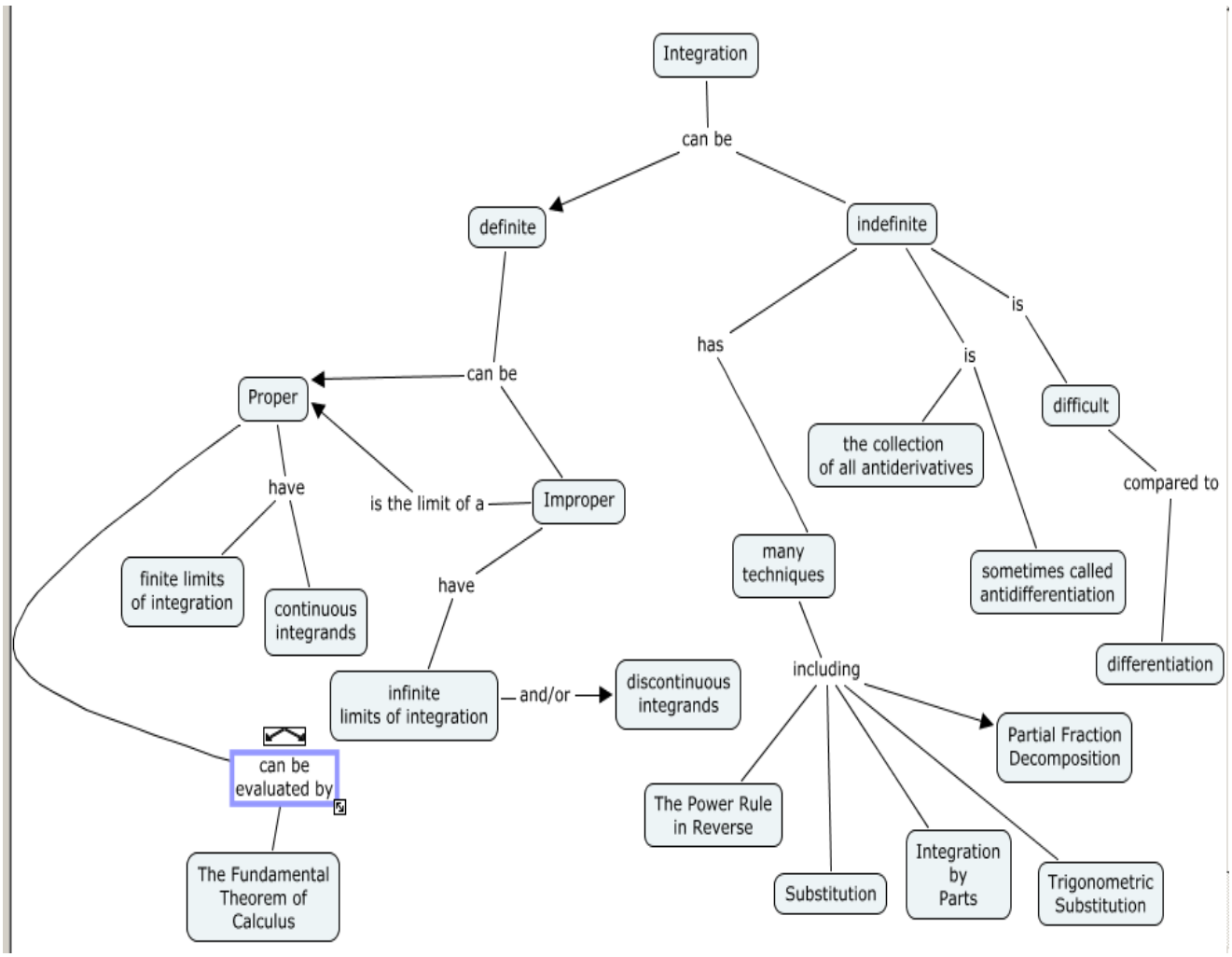
Figure 3.5. A homework concept map of Kantianism.



A Professor's map when planning a lesson.

Michael Reed, a professor in mathematics, has completed several maps that introduce his students to mathematics principles. Below in figure 3.6 is a working map that he is developing as he prepares a forthcoming lesson.

Figure 3.6. A work in progress for a forthcoming mathematics lesson on "Integration."



Using these maps to plan and think about a lesson enables the professor to better prepare relevant mathematical principles and referent concepts with previously learned concepts so that students can better understand and apply these principles to relevant work and everyday circumstances.

An example introducing the class to the concepts to be studied during the semester in Computer Programming.

Sachin Shetty, a professor of engineering, developed this concept map as an introduction for his students in computer programming (see figure 3.7)

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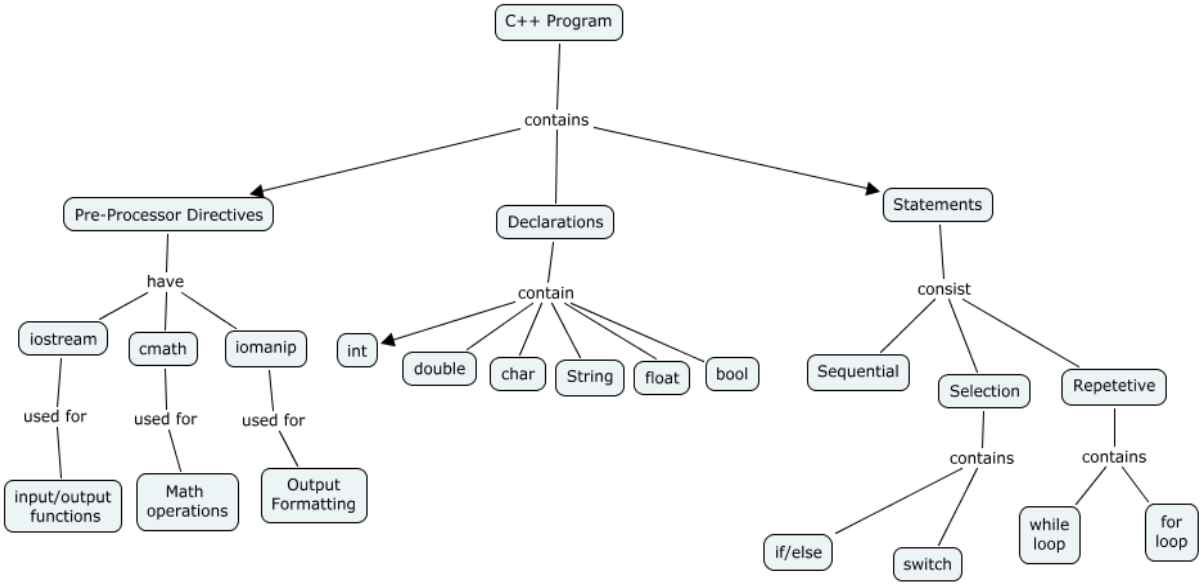
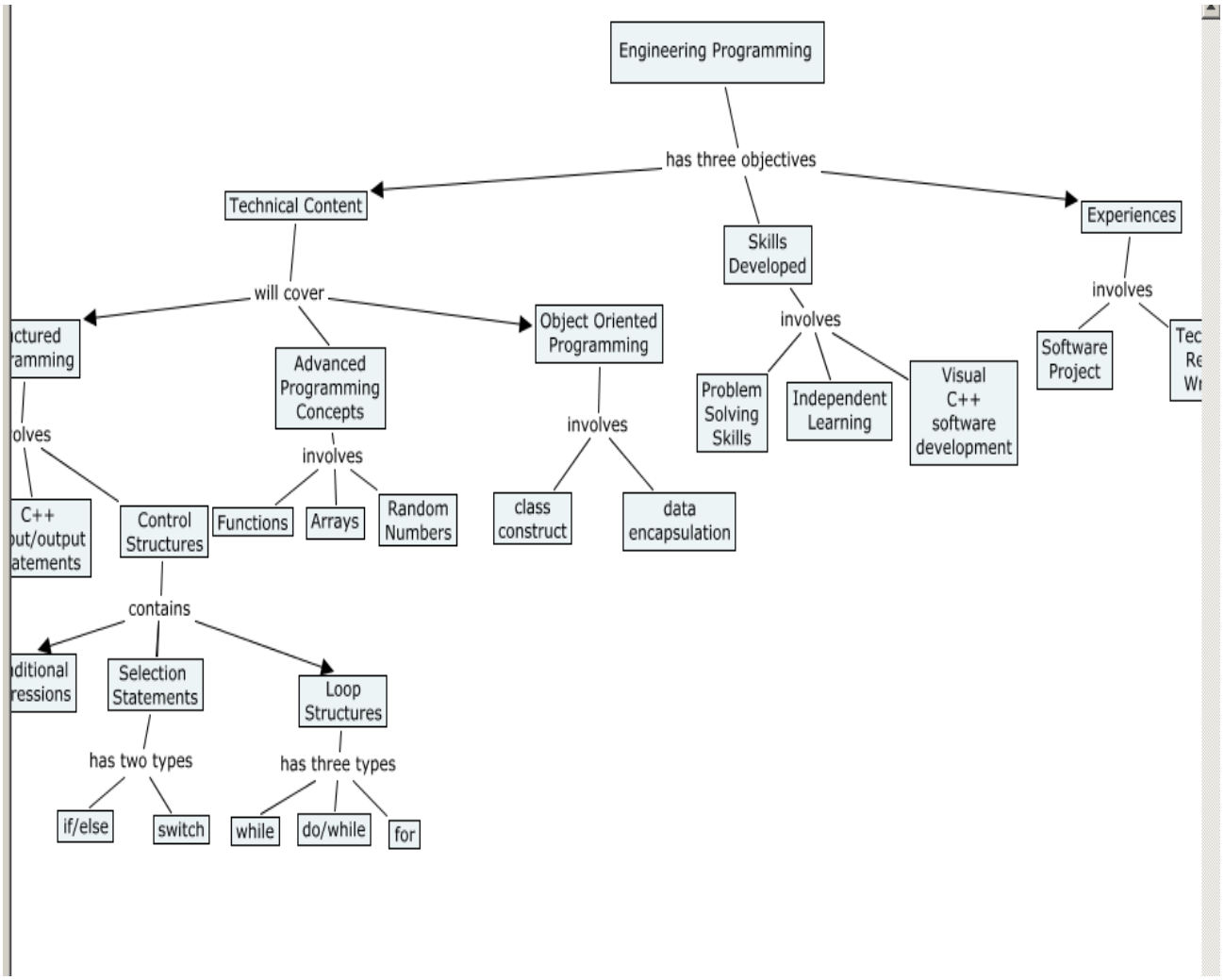
Figure 3.7. Semester Overview of C++ Program.



Dr. Shetty's map used to introduce a lesson.

Preparing students with a mindset for a forthcoming lesson is very important. Dr. Shetty uses the map shown in Figure 3.8 to introduce his students with new information.

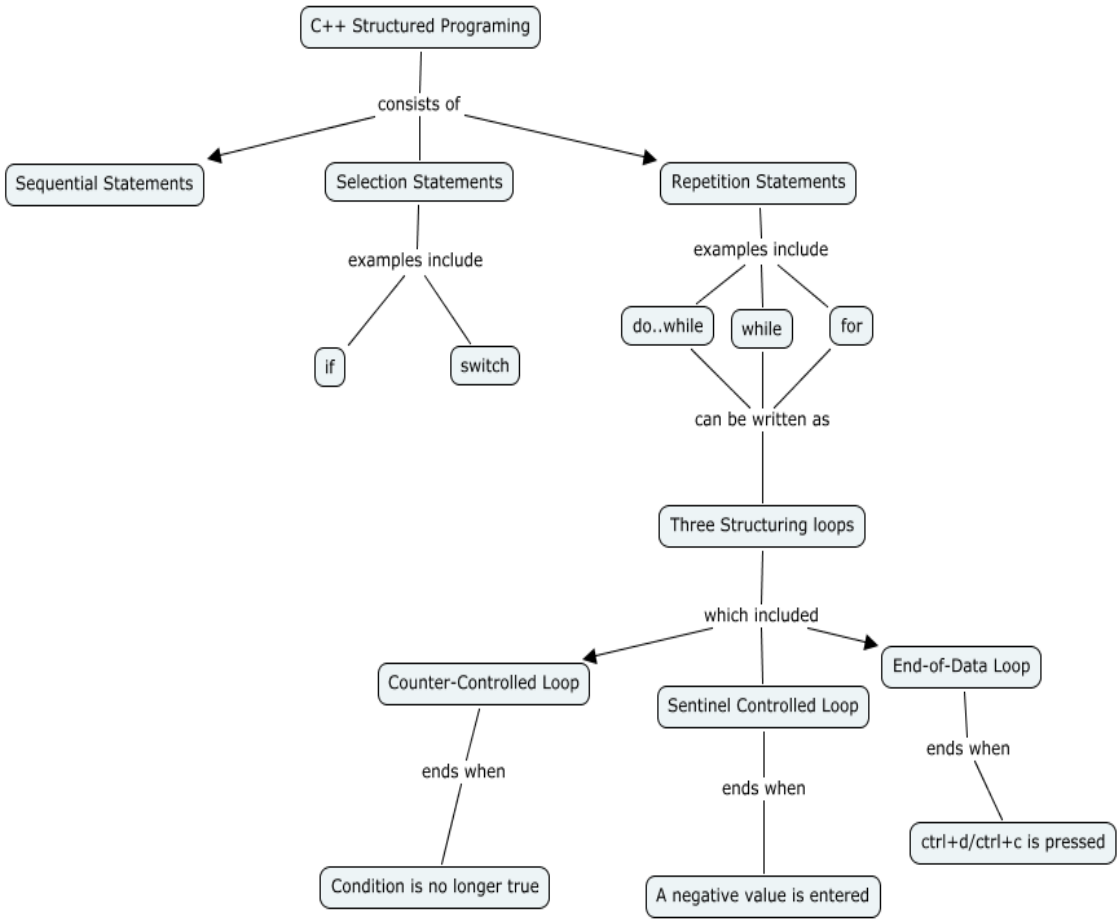
Figure 3.8. A partial view of a concept map used to introduce “Engineering Programming.”



Student Homework

Dr. Shetty has his students develop their own individual concept maps on homework assignment affiliated with this information. Below in Figure 3.9 is a representation of one of his students’ maps.

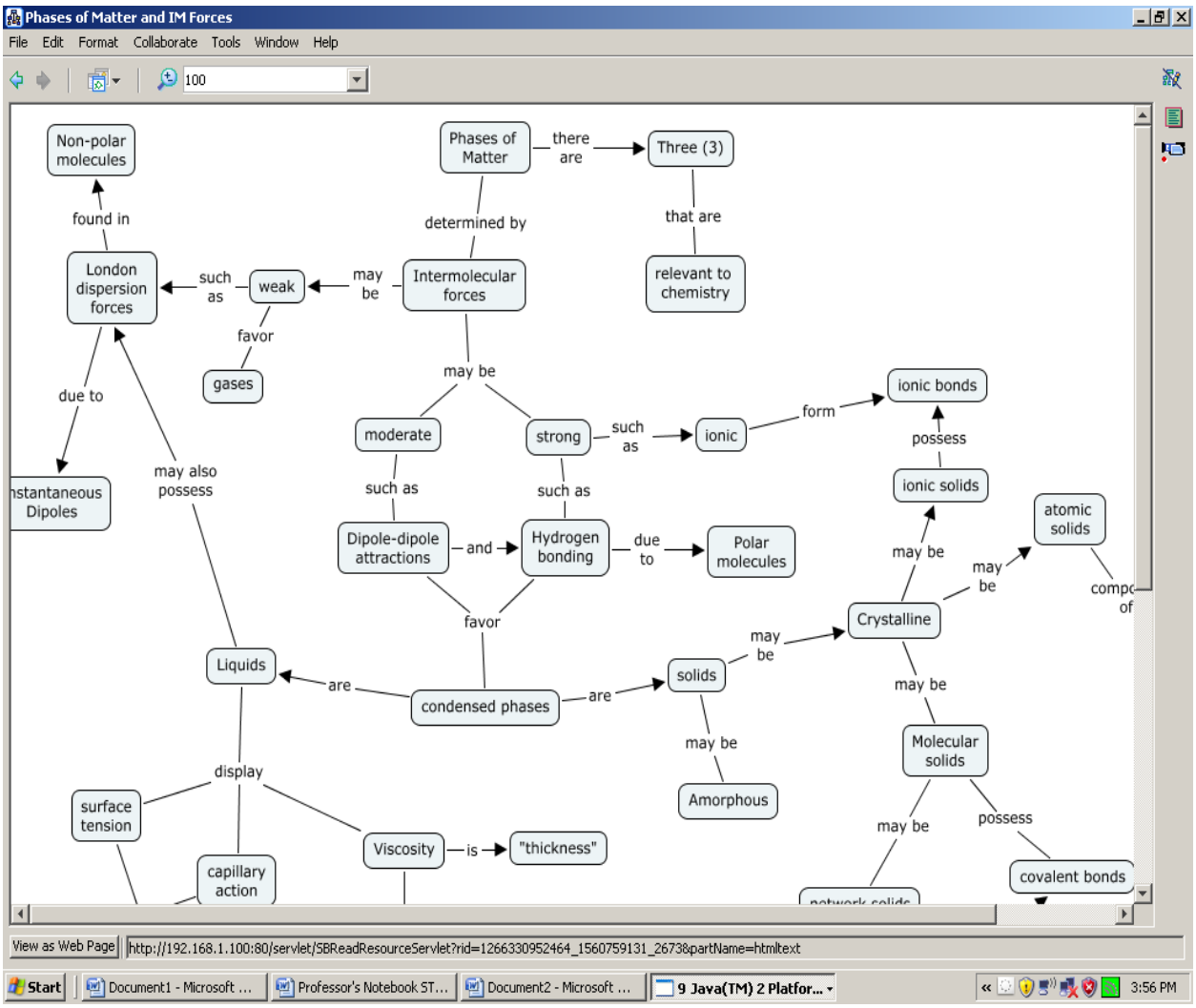
Figure 3.9. A student’s concept map representing ideas with a homework problem.



Professor and Student Examples in Chemistry.

Josh Moore introduces his students with a concept map to provide them with an overview of a lesson “Phases of Matter”. A partial map is shown in Figure 3.10.

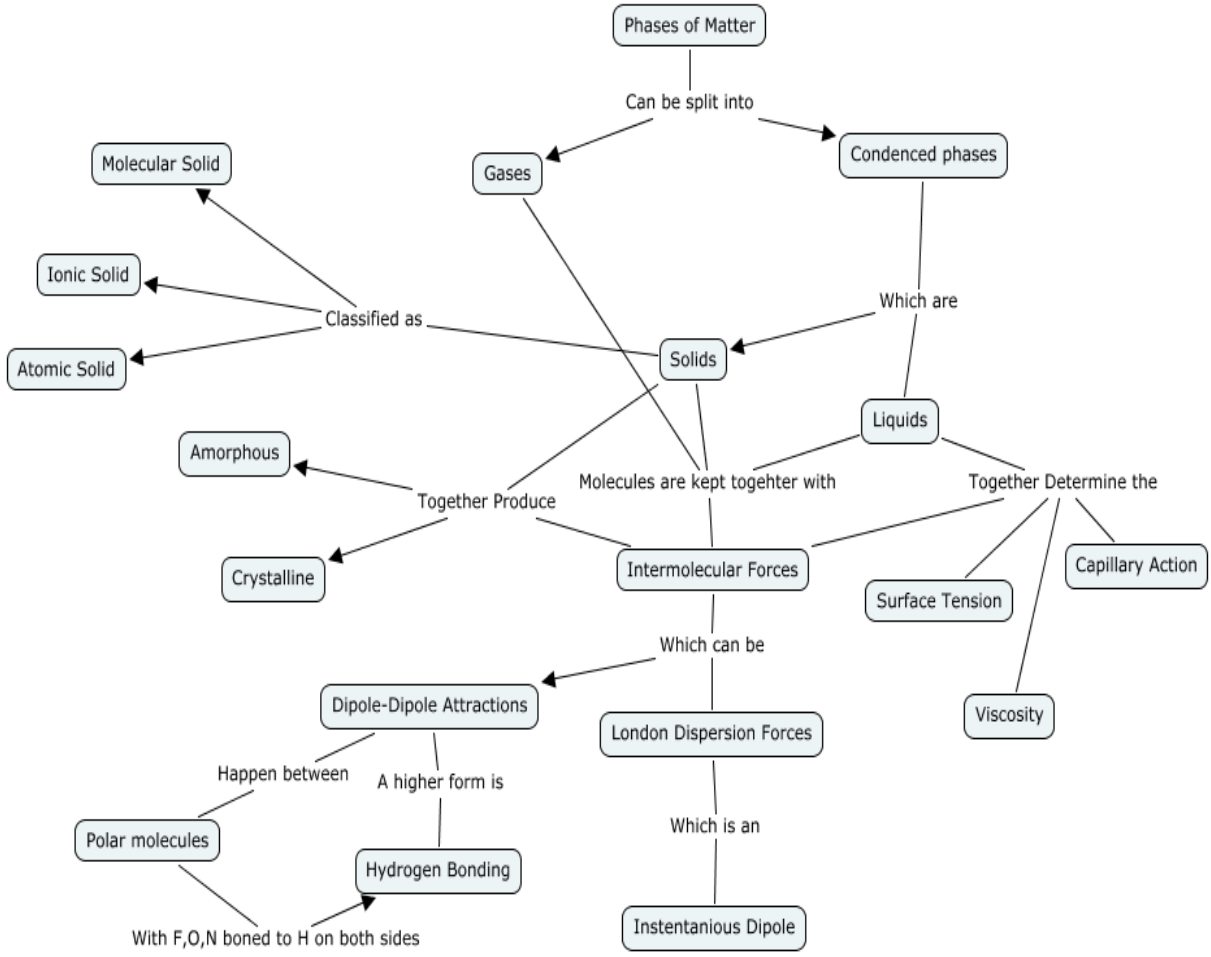
Figure 3.10. Introductory lesson on “Phases of Matter.”



Student Homework map on this concept.

In Figure 3.11, a student's concept map titled: Assignment 1 – Phases of Matter, is shown.

Figure 3.11. A student's concept map: Assignment 1 – Phases of Matter.



Procedures for Mapping Written and Oral Presentations:

Concept maps can also be used for recording or rewriting notes, or for generating ideas when planning a written or oral report. The steps and procedures involved are similar to those used in "mapping a text," given previously. They are as follows:

1. **Select** a topic and decide upon the most important idea to which all other concept words can be related. Put this key concept in the top-center of your paper. Think about how other concept words can be related to this central idea. (Brainstorm your thoughts.) Make a listing of each of these concepts on a sheet of paper.

2. **Rank** these concept words hierarchically from most inclusive (general) to least inclusive (concrete and specific). Eliminate the ones that do not pertain to your key concept.

3. **Arrange** the concept words on your paper according to hierarchical structure and relationship. For example, concepts that can be subsumed and/or related to each other. At this time, you may want to rearrange or redo your map. You also may add other concepts to the arrangement.

4. **Link** the concept words by drawing lines showing the connections among and between the ideas. Label each line using a word or word phrase to explain the relationships. If an idea relates to others that have already been represented in another portion of the map, show the relationship of this idea by drawing a broken line to indicate cross linkage.

5. **Review** your concept map. Look again at your concept map. Can you add any other information to the map? Can you think of another way that this map can be developed?

6. **Write** a paragraph(s) describing the conceptual arrangement of the map. This is a relatively easy process since the map is now organized into coherent and unified threads evolving from a focus or theme.

If a student disagrees with the text or fails to understand it, we suggest that the student make his or her own ***personal concept map***. This personal map allows the student to visually display how he or she perceives the ideas in the text. The teacher is then able to spot misconceptions or see creative thought being expressed.

As we have seen, concept mapping is a way to clarify ideas appearing in texts and to represent and share ideas through a visual display. Concept maps can also be used when critiquing poems, short stories, political essays, science experiments, student writings, descriptions of nutritional recipes, mathematical principles, and so on. Students who are having difficulty with school reading may use this technique to better perceive and relate the ideas in the text. Concept mapping is a way to show students that knowledge is more than literal fact gathering.

At first, concept mapping is not an easy task. While the directions may seem easy, the actual implementation of these directions are not. It takes patience and practice. The more one attempts and uses concept mapping, the better its purposes are understood.

Concept mapping has several advantages:

1. It allows an individual to visually display ideas, facts, and supporting details about a topic that can be discussed and debated with the teacher and peers.

2. It helps to clarify misconceptions and organize complex ideas appearing in textbooks.

3. It stimulates thinking and ensures active participation. The reader takes the role of an *active thinker*. Involvement with the text triggers language as a thought activity in which ideas are related and assimilated into a meaningful whole.

4. It enables students to write meaningful discourse. Students can look at their maps and write coherent paragraphs based upon the map's organization. Redoing the map constitutes reconstructing and redrafting one's ideas.

5. It helps students review content that was previously studied and integrate concepts across passages.

6. It is a mechanism by which ideas are generated when planning a written or oral report, or when reviewing for an examination.

7. It promotes self-awareness within individuals to regulate and become conscious of their own thinking.

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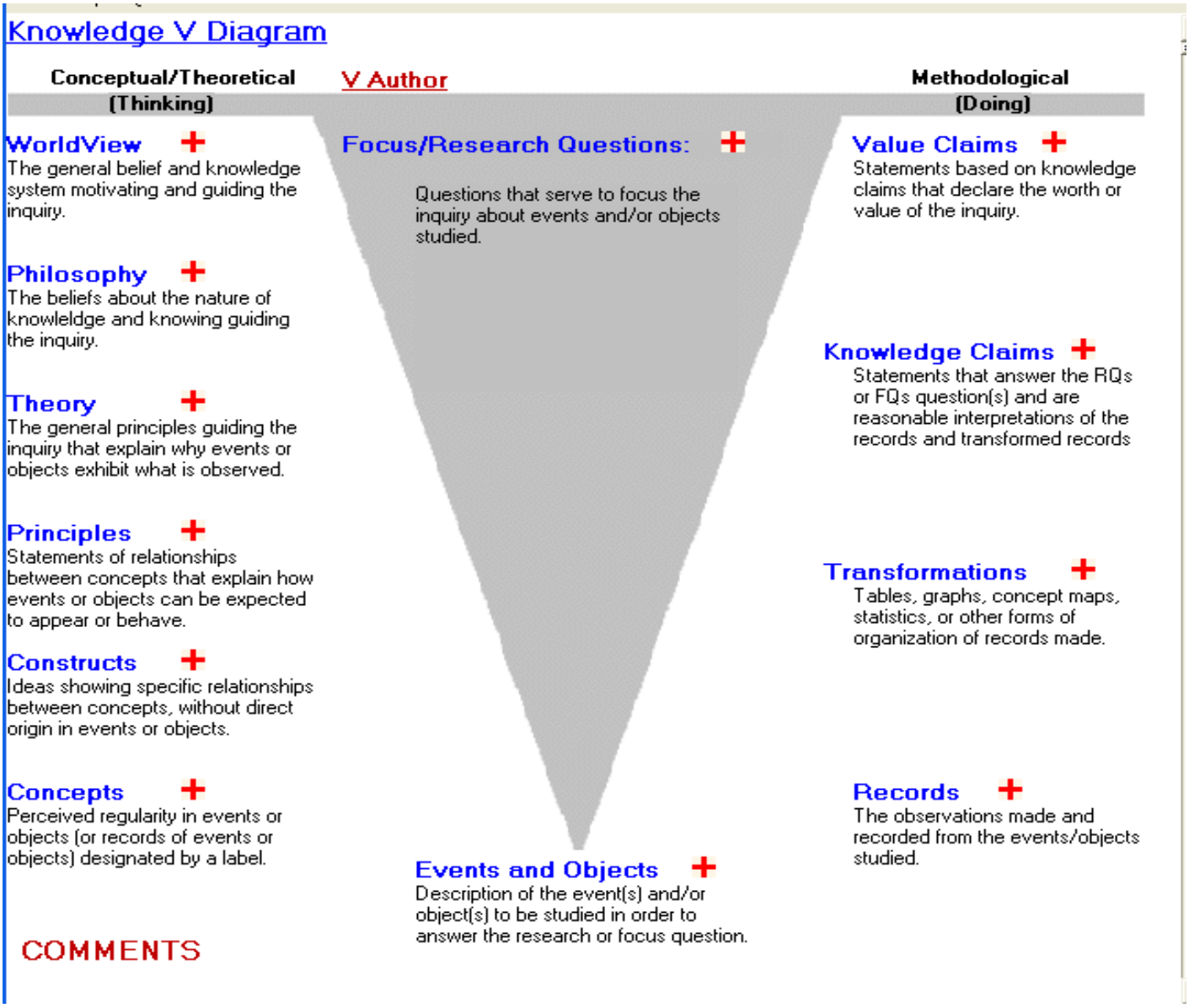
V Diagrams:
Understanding the Structure of Knowledge

The **V** heuristic was developed by Bob Gowin (1981) to enable students to understand the structure of knowledge (e.g., relational networks, hierarchies, combinations) and to understand the process of knowledge construction. Gowin's fundamental assumption is that knowledge is not absolute, but rather it is dependent upon the concepts, theories, and methodologies by which we view the world. To learn meaningfully, individuals must choose to relate new knowledge to relevant concepts and propositions they already know. The **V** is a way to help students understand meaningful relationships between events, processes, or objects. It helps students to see the interplay between what they already know and the new information they are attempting to understand.

The **V** can be used in one of three ways: (1) to plan a research study; (2) as a teaching tool for students to better understand how knowledge is constructed; and, (3) to analyze research reports, textbooks, and curriculum materials,

The **V** is a name derived from the shape of the diagram. A **V** diagram is a structured, visual means of relating the methodological aspects of an activity to the underlying conceptual aspects. It focuses on the salient role of concepts in learning and retention. A **V** diagram is shown in Figure 3.12.

Figure 3.12. Gowin's **V** showing epistemological elements which are involved in the construction or description of new knowledge. All elements interact with one another in the process of constructing new knowledge or value claims, or in seeking understanding of these for any set of events and questions.



Source: D. Bob Gowin and Marino C. Alvarez. *The Art of Educating with V Diagrams*. New York and Cambridge UK: Cambridge University Press, 2005.

The **V** diagram has a **conceptua**l (thinking) left side and a **methodological** (doing) right side. Both sides actively interact with each other through the use of the *focus question(s)* or *research question(s)* that directly relates to events and/or object. The point of the **V** contains the events and/or objects that are to be observed.

The conceptual side includes *world view*, *philosophy*, *theory*, *principles/conceptual systems* (which include developing a concept map), and *concepts* all of which are related to each other and to the *events and/or objects* on the methodological side of the **V**. These *records* of events and/or objects (facts) are *transformed* into tables, graphs, charts, figures, and so forth and become the basis to make *knowledge* and *value claims*. While there is no set way in which to read a **V** Diagram (either from left to right or right to left, top to bottom or bottom to top, or anywhere in between), it is advisable to begin with the events at the point of the **V** followed by the focus or research question(s). The reason for such a progression is that the event is paramount in determining the focus or research question(s) for the inquiry and the subsequent interplay among the conceptual and methodological elements.

Introducing the V

Students should first be familiar with, and be able to construct concept maps before using the **V** (refer to section on concept mapping). Once students are acquainted with using concept maps, they are shown how concept maps supply most of the information on the "left side" of the **V**. Introducing the concept mapping procedure first also familiarizes students with two elements of the **V**: concepts, and events and/or objects. These terms are defined in the concept mapping section.

The steps for using the **V** with students are as follows:

1. The *events and/or objects* determine the kinds of *questions* that are asked. Clarifying these two components, the question and event, are the critical initial steps in any study.

2. The *concepts* are derived from the events or objects that have been or will be studied that need to be clarified.

3. *Records* are the facts that are gathered of the events/objects being observed. Students are shown by demonstration and explanation how records are used to observe events or objects. Based on these observations of events or objects, records are made (e.g., field notes, interviews, measurements of time, length, weight, height, temperature, audio and video tapes, documents, and so forth).

4. After records have been made of the facts, the information is *transformed* into a format that allows the student to construct answers to the focus question. This information is organized and put into a format (such as a table, graph, chart, diagram, and so forth).

5. Using the information from the *transformed* data, *knowledge claims* are constructed to answer the focus question(s). Students' thoughts as to why these *knowledge claims* are made are in accordance with their prior knowledge about the concepts and principles already known to them.

6. *Principles* and *theories* follow knowledge claims when introducing the **V**. *Principles* tell ***how*** events or objects appear to behave. For example, in an experiment with sprouting seeds, a principle derived from the outcome is "Plants need air, water, soil, and light to grow." *Theories* show ***why*** events or objects appear to behave as they do.

7. *Value claims* are statements of self-worth. This involves the affective component. It is an expression of feelings about the findings of the inquiry. "What good is it?" "Who cares?"

Value Questions:

1. *Instrumental Value Question*. Is X good for Y?
   Is it good to know why students are dropping out of school?
   Is this knowledge good for the community?
   Is it good for future academic achievement?

2. *Intrinsic Value Question*. Is X good in itself?
   Is dropping out a school good?
   Does dropping out of school promote self-esteem?
   Does knowing the factors that affect school dropouts promote student awareness?

3. *Comparative Value Question*. Is X better than Y?
   Is preventing school dropouts better than avoiding the issue?
   Do high school graduates fare better in wage earnings over a life-time than do high school dropouts?

4. *Decision Value Question*. Is X right? Ought we choose X?
   Ought we examine the causes of high school dropouts and reform our curriculum?
   Is it right to let high school students at risk for dropping out of school fend for themselves?

5. *Ideal Value Question*. Is X as good as it can be, or can it be made much better ideally?

These components, once completed, comprise the structure of knowledge of an event or object. Structure, in Gowin's **V**, refers to the elements and their relation to each other. This structure of knowledge can be analyzed by answering the following five questions which Gowin has termed the Q-5 Technique:

Q-5 Technique

1. What is the focus or telling question? What does it tell <u>on</u>, or is about? (Event/Object).

2. What concepts are needed to ask the question?
3. What method(s) are useful in answering the question or questions?
4. What answers are produced?
5. What value do they have?

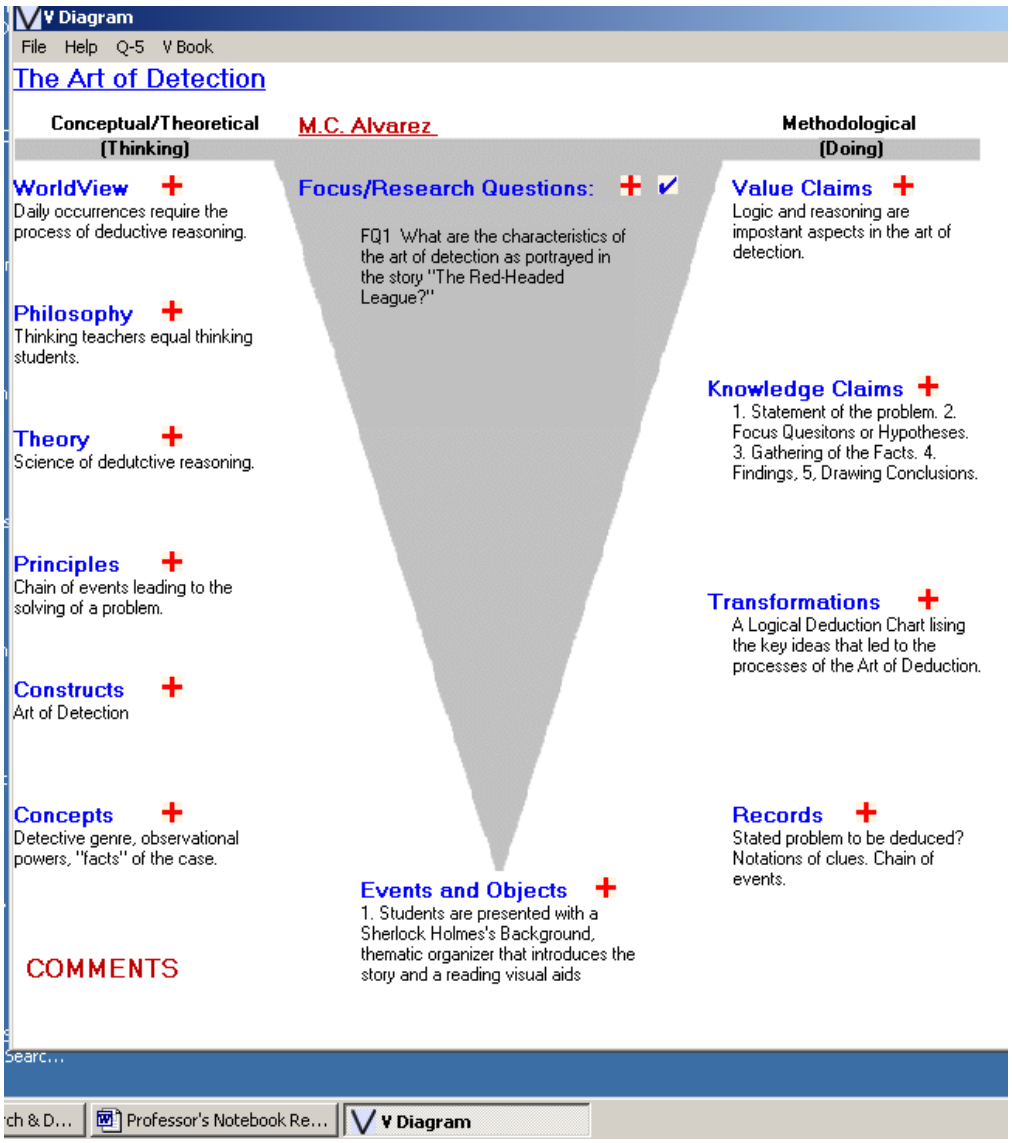
In short, what's the question? What concepts are used to ask the question? What procedure is used to answer the question? What are the answers? What value do they have?

These questions enable students to either plan or analyze a document or report. They also engage students in an inquiry to problem solve (e.g., mathematics problem, science experiment, and so forth).

Using the V as a Teaching and Learning Tool

The **V** can be used by the professor as a tool to enhance students' knowledge within an area of study. As a way to show how this can easily be implemented with students, the following **V** diagram shown in Figure 3.13 to guide students into learning about "The Art of Detection" by reading the *The Red-Headed League* by Arthur Conan Doyle.

Figure 3.13. A Lesson Plan for "The Art of Detection."



Using the V Diagram for Evaluation

The following steps are recommended by Novak and Gowin (1984) when evaluating a research paper:

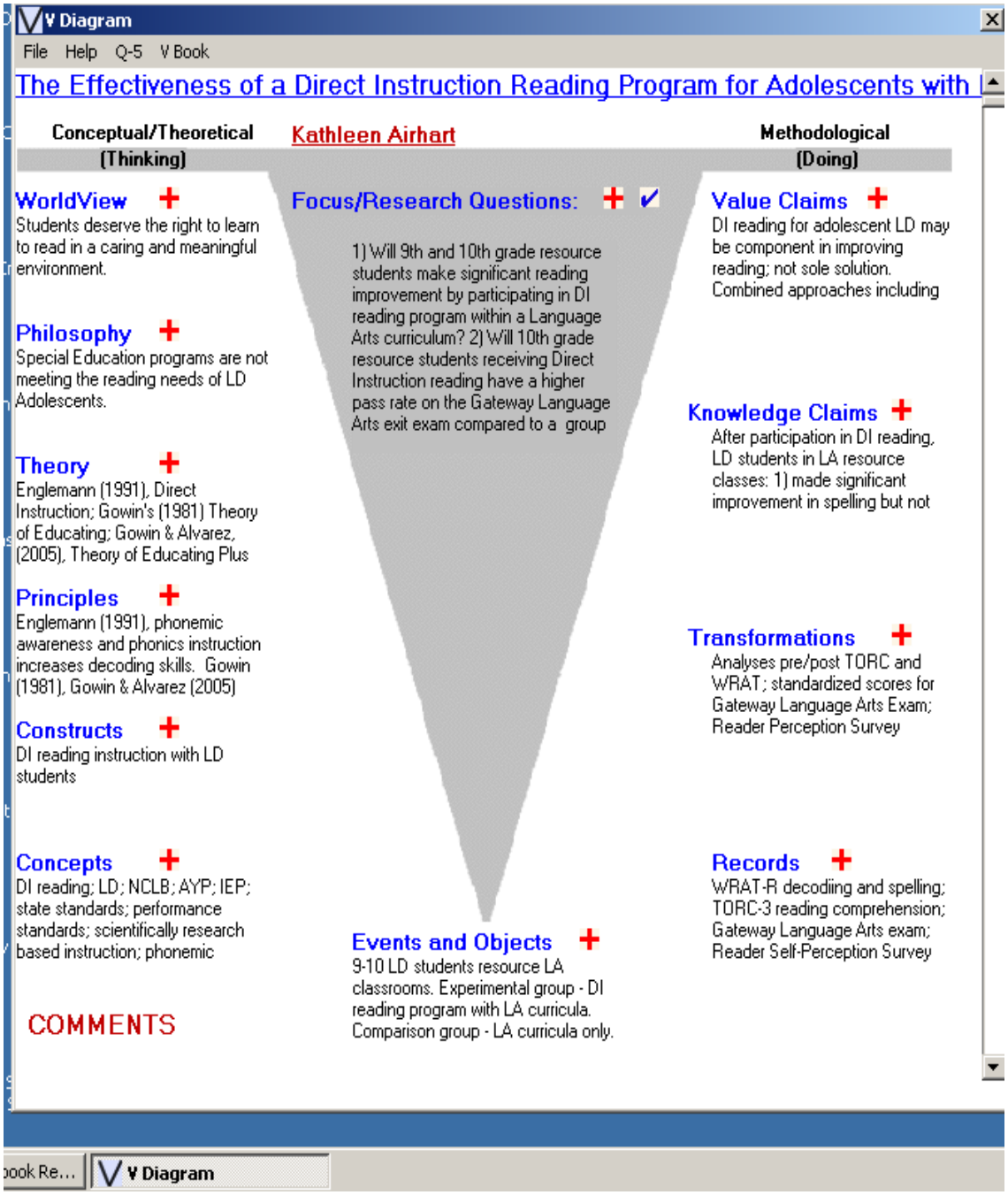
1. What objects and/or events were being observed?
2. What records or record transformations were made?
3. What was/were the focus or research question(s)?
4. What relevant concepts or principles were cited or implied?
5. Do the records that were made validly record the main aspects of the events and/or objects observed?
6. Are relevant principles stated, implied, or ignored?
7. What theory was stated or implied in the research, if any?
8. Is there a conscious, deliberate effort to tie concepts and principles to the (a) events and/or objects observed, (b) records made, (c) record transformations, and (d) knowledge claims?
9. Were any value claims made, and if so, are they congruent with the knowledge claims?
10. Was there a better focus question, or do the results answer a focus question other than what was (or can be inferred to have been) stated?

Planning a Research Study

V Diagrams are also effective when planning a research study. Professors can use it when they are preparing an investigation, and students can use it when they are planning a research study (e.g., master's thesis, doctoral dissertation). An example of a study in progress is shown below. This study, once completed allows the researcher to write the report and discuss findings from this single page.

Kathy Airhart used the **V** diagram to plan, carry out, and finalize her doctoral dissertation. This **V** is shown in figure 3.14.

Figure 3.14. A display of a visual representation of a completed study using the **V**.



Writing Around the V

Once a piece of knowledge has been analyzed, it is relatively easy for the student to use the **V** diagram to write a paper of the outcomes. All of the elements necessary in writing a comprehensive paper are contained with the **V** diagram.

Students are better able to visualize the merits or shortcomings of an experiment, a mathematical problem, a research report, or a textual reading by writing their reactions. Their analysis is more comprehensive as a result of using the Vee. Their paper is more exact and contains far more pertinent information than simply listing the facts or results.

By "writing around the **V**," students will deal with: (1) what events or objects they are observing, (2) what concepts they already know that relate to these events or objects, and (3) what records are worth making. They can be guided in formulating focus or research questions that are directly based on the event/objects to be studied.

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CHAPTER 4

Teaching Students About Taking Notes From Lecture or When Reading Textbooks and Supplementary Materials

We may take for granted that college students know how to take notes, and are able to distinguish important from unimportant information. This is not necessarily the case. The Cornell System suggested by Walter Pauk for taking notes by college students is easily adapted for use when reading textbooks and supplementary materials. To teach your students to use this method, follow these steps:

1. On 8 ½" X 11" paper, draw a vertical line 2 ½" from the left margin of the page, leaving a 6" area on the right to make notes. The left margin will be the *recall* column. Some note pads are printed with this extra wide margin. Draw a horizontal line three or four lines from the bottom of the page. This space will serve as a *summary* section for the information on this page.
2. This *recall* margin stays blank while the student reads and takes notes.
3. The area to the right of the vertical line is used by the student to make notes of the reading.
4. After the reading has been completed and the notes have been recorded, the student then uses the left margin to write key words and phrases which summarize the notes.
5. The section at the bottom of the page is used to summarize the information on the page. It is further advised that the student complete an overall *summary* of the chapter by devoting the last page following his/her note taking for this purpose.

As students read the textbook, they rephrase and condense the material. It is important for students to think through the author's ideas before recording. Therefore, it is necessary for students to finish reading an entire paragraph or a headed section before writing. Summarizing the paragraph into a single sentence enable students to get the gist of the author's message and avoids rote copying. This recording procedure also helps the reader see the authors' patterns of organization.

The key words and phrases written in the *recall* column should act as clues that trigger the memory and establishes a relationship with the original notes written in the right-hand column. The purpose of the *recall* column is to remind the reader of the key words and concepts that are included in the notes in the right hand column from the text. The *summary* section at the bottom of each page allows the student to write a capsule review of the information that appears on the page of notes. Box 5.1 shows a sample of notes using this technique.

Box 5.1. An Example of taking notes from a textbook/lecture.

Recall Column	**Record Column**

	Chapter 3 – Political Ideas from the Thirteen Colonies
First Elected Representative Assembly	**Representative Government** Virginia House of Burgesses formed in the Jamestown Colony in July 1619, one year prior to the landing of the Mayflower. Members elected by adult males.
Connecticut's Written Plan of Government	**A Written Constitution** "a plan of government" Thomas Hooker and his followers left the Massachusetts Bay Colony and settled in Connecticut. They believed in "free consent" of the people. They wrote a constitution titled Fundamental Orders of Connecticut.
Provisions of Connecticut's Constitution	1. Created a representative assembly. 2. Elected officials from each town to serve in the assembly. 3. Elected officers of the assembly. 4. Elected governor. 5. Elected judges.
	The first representative form of government consisted of elected members to the Virginia House of Burgesses. Connecticut's Constitution served as the first plan of government. Consisted of an elected assembly who believed in "free consent."

To *study* the notes, the student covers up the notes in the right-hand column with a sheet of paper, leaving the words in the *recall* column exposed. Using the first of the cue words written in the *recall* column, the student tries to remember the information that appears opposite

in the right-hand column by *reciting*. The student then checks his work by sliding the paper down and comparing what was recalled with the information originally recorded. This enables the student to determine how many of the important facts and ideas he was able to remember. The student reviews this portion of notes until he is able to remember its organization. Then he continues to the next recall clue on the page, following the same procedure of self-testing and checking. At the end of each page the student should summarize the information. Summarizing the assigned reading on the last page of each note taking session is recommended. Upon completion of writing the overall summary, the student *reviews* the information as often as necessary, pausing to *reflect* upon the facts and ideas read.

It is during this *reflecting* stage that the student thinks about the facts and ideas.

*How important are these facts and ideas?
*Where have I read or experienced these facts and ideas before?
*Based upon what I have read or experienced how can I apply these facts and ideas to other situations?

As the student reflects in this manner, ideas begin to evolve as a result of assimilating what is read with what is already known. These ideas which evolve from reflective thinking can be inserted in the summary section adding to the students' knowledge, retention, and application of the assigned reading within a chapter. With practice, this reflective stage becomes an integral part of the students' regular learning-reasoning process.

Combining Textbook and Class Lecture Notes

Too often college students are ill-prepared to take effective notes from professors' lecturers. The procedure described above when taking notes from a textbook is readily adapted with minor revisions:

-----2/1/2"----	----------3"---------- ---------	3"----------
Cue words, phrases, and listings.	Notes from textbook	Notes from lecture
Summary		

It is assumed here that any professor's lecture will be *well organized*. For such lectures, the notebook format remains the same with the exception of adding a third column, referred to as the *lecture note* column. Notes from the assigned reading in the textbook are recorded in the middle column with the clue words written in the *recall* column. The third column is used to record the

notes of the lecturer's explanations, examples, illustrations, etc., that add to each corresponding item appearing in the middle column.

After class, the student compares the cue words appearing in the *recall* column with the corresponding information she has recorded in the third column and combines the two sets of notes by providing additional cue words where necessary. The student can further organize the notes from the text with the days lecture notes by combining them under each respective heading on the *summary* page. The *summary* page is the last blank page in the students' notebook following the recorded notes. The *summary* page can be divided into halves by drawing a line down the middle of the page (see Box 5.2).

Box 5.2 - Summary Page

Summary of notes taken from textbook	Summary of notes taken from lecture

The left-hand column contains a written summarization from the notes taken from an assigned reading. The right-hand column is left blank until the student fills in the corresponding information that has occurred from lecture or by class or group discussions.

Inserting *cross-reference notations* by each relevant heading to the corresponding heading in the *summary* page leads to a fuller understanding of the facts and ideas that have been read and recorded. Also by organizing the facts, events, and ideas under relevant categories enhances the students' conceptual understanding of the textbook.

It may take a little experience for the student to judge how much space should be allocated in the right hand column so that this information will correspond with that in the left hand column. This will depend upon the amount of new ideas and information generated by the lecture and/or discussion. By keeping notes in this paired comparison method, the student is able to see the relationship between the notes taken from the textbook and those supplemented by lecture and discussion. The student is able to compare and contrast the notes taken from text and

through lecture and discussion. Questions which arise as a result of the notes taken from the text and the information evolving from the lecture and ensuing discussion are thereby clarified for the student. It is suggested that the professor take the students through a prepared practice exercise using specific examples from the class textbook.

The note taking/study procedure aids students in getting their thoughts and ideas on paper. It allows them to compare their records of the text with the thoughts of the professor and other students. It allows them to reorganize their ideas and to clarify any misconceptions that may have encountered when reading the text. The note taking procedure gives them a written record from which to refer to, make changes, and study.

Helping students to take charge of their own learning by showing them (not telling) how is a vital step in making them independent learners. Many frustrated students have never learned how to learn for themselves. Students need to be assured that their ideas are worth listening to, and that through mutual respect (teacher-student, student-student) and sharing of ideas that learning can be viewed in a new and different light, and that the bottom line is comprehension.

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Preparing Students To Learn By Listening

Listening is a skill that requires processing information at different modes of

comprehension. Being able to distinguish fact from opinion; pertinent ideas and supporting details from less important or unimportant one's; and, the ability to discern whether or not the speaker is persuasive because of related arguments based on logical principles and facts, are skills that need to be taught. Students cannot be expected to simply understand and learn from information presented orally. They need to be shown how to pay attention and differentiate between important and relevant facts and ideas as opposed to those that are less important or not relevant.

The value of listening to another's ideas is important if we expect communication and the sharing of ideas to result. Students need to be made aware that listening helps them to understand other points of view. It helps them to understand what is needed to complete a lesson, and it leads to pensive and reflective thinking in solving problems and completing assignments. Likewise, the professor needs to be aware of what students are thinking and feeling. Too often explanations are given, questions are asked, and assignments made without considering whether students have really understood what they are supposed to do. This results when the teacher assumes that all or most of the students should have understood what was in his or her mind. In other words, often the directions, ideas, formulations, and understanding of how an assignment is to be learned and accomplished are more vivid in the teacher's mind than the students. *What* students are being asked to learn is often not made clear in the oral explanation.

There are ways in which the professor can assure that students understand what is important in either undertaking an assignment or in determining important ideas and points in an oral presentation. One way is for the teacher to develop a ***listening guide***.

Richard Castallo[3] has emphasized the importance of being able to listen and to discern the important points being discussed by a speaker. He suggests that the teacher prepare a well-organized lecture on a topic currently being studied in class.

The following procedures are suggested for the professor when making a *listening guide*.

1. Underline those concepts that students should have in their notes at the completion of the lecture.
2. Make a skeletal outline of the major points that will be discussed. For example,

Water

Evaporation: _____
Principle: _____
Examples: _____

[3]Richard Castallo. Listening Guide - A First Step Toward Note taking and Listening Skills. *Journal of Reading*, 19, 1976, 289-290.

Condensation: _____
Principle: _____
Examples: _____
_____

3. Make photocopies of this outline and distribute them to the class. Make a photocopy of this outline on an overhead transparency and have students follow along with your entries.

4. Elaborate and explain each main point. Demonstrate and explain to the students the important facts and ideas with respect to the content of the lecture.

Listen-Read-Discuss

Another method to enhance listening skills is the ***listen-read-discuss*** method developed by Anthony Manzo and Ula Price Casale.[4] This procedure combines listening with reading a portion in a text and then discussing the important points in the reading.

The following steps have been adapted for use by the professor in this procedure:

1. Use a reading from the text that is well-organized. Prepare a lecture from this reading and deliver it to the class for about half of a class period.

2. Have the class take notes as you present the lecture. Be sure to show your class how to take notes using the procedure described above in the ***listening guide***.

3. Upon completion, have the class read the pages covering the material of the lecture. Ask them to compare their notes with the reading.

4. Discuss with the students the points made by the lecture and how they related to the reading. Clarify any misconceptions or uncertainties. Questions such as "What did you understand best from what you heard and read?" "What did you understand least well from what you heard and read?" "What questions or thoughts did this lesson raise in your mind (about reading and learning, or about related issues)?" The order of the questions and the number of similar type questions will vary depending upon the material, class needs, and professor objectives.

Both of these methods help students to better understand and value listening as a way to mentally organize information and make notations in a meaningful manner. Each of these procedures can be related to the note taking system shown earlier. Teaching students how to

[4]Anthony V. Manzo and Ula Price Casale. Listen-Read-Discuss: A Content Reading Heuristic. *Journal of Reading*, 28, 1985, 732-734.

organize words into meaningful relationships is an important move in the direction of fostering independent learning.

Written Summaries

Students may need to be taught through direct instruction how to summarize important ideas and details contained within an assigned reading. Expecting students to write summaries without instruction is akin to having them read a book without any direction or purpose.

Read, Encode, Annotate, and Ponder (REAP), developed by Marylin Eanet and Anthony Manzo, is a strategy used to increase reading comprehension by having students respond to self-directed questions that relate to the author's message.

The four-step process consists of:

R - *Read* to discover the writer's message.
E - *Encode* the message by putting it into one's own language.
A - *Annotate* by rewriting the message in notes for oneself or in a thought book [a loose-leaf notebook kept in a place where other members of the class have access to it].
P - *Ponder*, reconstitute the message (now in annotation form) through discussion with others.

It is recommended that students be taught to annotate before this technique is initiated. Eight kinds of annotations are described below:

1. *Heuristic* (from the Greek *heuriskein*: to discover a fact) is an excerpt in the author's own words. The annotation should be the author's statement of the main idea of the selection.
2. *Summary* annotations condense the selection into a synopsis of the main events of the plot. On a nonfiction selection, the significant ideas are arranged to show their relationship, omitting details.
3. *Thesis* is a telegram-like statement of the author's proposition. With fiction, it can substitute for a statement of theme.
4. *Probe* is a focus question that directs attention to the ideas that are most germane. The annotator must first determine "What question(s) is the author answering with the narrative?" Emphasis is given to *verification*, *consequence*, and *alternatives*.
5 . *Critical* is the annotator's response to the author's thesis, deciding to agree, to disagree, or to agree in part. The first sentence should state the author's thesis; the next, the annotator's position, and the following sentences are devoted to defending or expanding the position that the reader takes.
6. *Intention* is a statement of the author's intention, plan, or purpose as perceived by the annotator. This is particularly useful with material of a persuasive, ironic, or satirical nature. Determining intention requires intrinsic clues such as tone and use of language,

and knowledge of the author.

7. *Motivation* attempts to speculate about the author's likely motive(s) for having created or written certain things. It is an attempt to find the source of the author's belief system and perceptions. The motivation annotation is a high form of criticism. It often requires penetrating psychological insight.

8. *Personal view* is based on the readers' background experiences and prior knowledge with author's beliefs (main idea or thesis).

Below is a selection from the humanistic philosopher, Bertrand Russell.[5] The eight types of annotation described follow.

I propose, in what follows, to consider first the aims of education: the kind of individuals and the kind of community, that we may reasonably hope to see produced by education applied to raw material of the present quality. I ignore the question of the improvement of the breed, whether by eugenics or by any other process, natural or artificial, since this is essentially outside the problems of education. But I attach great weight to modern psychological discoveries which tend to show that character is determined by early education to a much greater extent than was thought by the most enthusiastic educationists of former generations. I distinguish between education of character and education in knowledge, which may be called instruction in the strict sense. The distinction is useful, though not ultimate: some virtues are required in a pupil who is to become instructed, and much knowledge is required for the successful practice of many important virtues. For purposes of discussion, however, instruction can be kept apart from education of character, because it is especially important in early years; but I shall carry it through to adolescence, and deal, under this head, with the important question of sex education. Finally, I shall discuss intellectual education, its aims, its curriculum, and its possibilities, from the first lessons in reading and writing to the end of the university years. The further education which men and women derive from life and the world I shall regard as lying outside my scope; but to make men and women capable of learning from experience should be one of the aims which early education should keep most prominently in view.

1. *Heuristic* annotation (discovering the main idea) - "I propose, in what follows, to consider first the aims of education: the kind of individuals, and the kind of community, that we may reasonably hope to see produced by education applied to raw material of the present quality."
2. *Summary* annotation - Learning to deal with the problems of our society are best accomplished through experience. The essence of which, is that learning from experience should begin with a child's early years.
3. *Thesis* annotation - The relationship of the community and the school in developing educated youths.

---

[5]Betrand Russell, *Education And The Good Life*, Albert & Charles Boni, 1926, pp.10-11.

4. *Probe* annotation - What are the psychological principles that develop a person's character? What is the distinction between character and education in knowledge? Russell stated that he discussed education of character as a separate entity from instruction.
5. *Critical* annotation - I (the student) agree with Russell that experiences are a definite part of a child's education for future learning, however, I am interested in his arguments separating instruction from the education of character.
6. *Intention* annotation - Russell seems to be intent on emphasizing learning from experience as an early goal of a child's education; continuing beyond our formative years as a prominent part of our educational process.
7. *Motivation* annotation - Russell seems to advocate the involvement of parents as well as other members of the community in the educational process as a vibrant moving force to compel quality teaching and learning. He dismisses the concept of improving intelligence by heredity, and, especially, by genetic control, either by artificial or natural means.
8. *Personal view* - There are considerable research studies to indicate that the extent to which one is able to relate personal knowledge and experiences to new learning situations determines the amount and degree to which this new learning will be meaningfully internalized.

You may want to begin this technique by taking one of the annotations (e.g., summary annotation) and presenting examples from a selected reading to the class. Upon completing the selection, the students compare what they have read with the your interpretation written either on the chalkboard or displayed on the overhead projector, or on duplicated study sheets. You may also want to present faulty examples (too broad, too specific, not applicable) as well as a comprehensive one, and have the students select the best annotation and explain the reasons for their choice.

Another passage is then read. The intention is for them to *pattern* the annotative process. You may want to select *one* type of annotation so that the students will not become confused. Explain the reasoning process to be used in developing that one annotation (e.g., summary annotation). The rewritings and thought processes used are written on the chalkboard so that students can understand what is involved in the construction of an annotation.

Students are then given reading passages from which they can practice writing the various kinds of annotations. They share their writings with other members of their group. Together they discuss what each has written and compare their responses.

The REAP procedure takes time to teach, but the benefits derived by the students are well-worth the effort. This procedure helps students *to think critically*; to ask questions as they read and to discuss their annotations with other members of the class; and to consider additional questions. A viable outcome of this procedure is that students learn another method to meaningfully interact with the text.

It is also important that students be able to present arguments supporting answers to questions. Simply giving responses and having them either confirmed as being either "right" or "wrong" by the teacher serves little if any lasting purpose. Teachers must be made aware if they are guiding students into "right" answers rather than allowing for discussion of opinions that may be divergent. Students must equally be shown that they can arrive at answers to questions based on careful introspection of the ideas presented in a question or discussion.

The degree to which reading materials are comprehended is dependent upon the richness of prior knowledge and experience possessed by an individual. Students need to be shown that what they know can be related to school learning. They need to be made aware of "signal" words and phrases that alert them to the intentions of the author given in a distinctive paragraph pattern (e.g., simple listing, process analysis, time order, comparison- and-contrast, cause-and-effect, problem solution, and so forth).

Paragraphs have purposes (e.g., introduce, define, contain examples, provide transition, identify problems and solutions, relate events in chronological order, present main ideas and details, and summarize). Helping students to identify the types of paragraphs contained in the textbook aids them in deriving the intent and meaning of the author. In so doing, students are able to make judgments, draw conclusions, and apply new information to other settings.

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CHAPTER 5
RECORDING THOUGHTS AND FEELINGS: JOURNAL WRITING

Writing is an important component of the reading and learning process. Vocabulary acquisition and development is enhanced when students are given the opportunity to express their

views through journal writing. Words come alive when we share and communicate our thoughts and ideas through writing. Having students keep journals of their thoughts, ideas, and feelings provides a forum for these views to be expressed.

Journal writing allows students to share their thoughts with their peers and professor. This sharing and exchanging of views helps to promote within a student a better and clearer understanding with topics of interest and subject-matter being studied. Students are encouraged and provided feedback from which to redraft their papers and complete a better organized and coherent writing. The professor is able to exchange ideas with the student by writing responses in their journal. One kind of journal that can be used with college students is the *reflective*.

Reflective Writing Journal

As the name implies, reflective journals give students an opportunity to think about what they are reading or listening to in an oral presentation or discussion. The student evaluates the information by asking: (1) How important are these facts and ideas? (2) Can these facts and ideas be related to prior knowledge and experience? and (3) How can these facts and ideas be applied to other situations? Notations are made concerning the ideas read and/or discussed together with ideas that are inspired from this reading, discussion, or presentation.

QUESTION: What do you know about this topic? What don't you know about this topic?

Some examples of how this type of journal can be used:

1. Students are asked to reflect upon what they have read in their textbook and after class and to write these musings (reflections) in their journal.
2. Students are given key vocabulary words presented in an assigned reading or in a class discussion and are asked to select a topic and include these words in a coherent writing.
3. To document an experiment.
4. To write what the mathematical principles can do in applied settings.

Reflective journals contain notations based upon careful thought and inquiry.

CHAPTER 6
TECHNOLOGY AND THE CLASSROOM

No longer is the textbook the single resource for our students. Students are now able to access the Internet in ways that textbooks cannot do. Most textbooks present information in a linear format. The Internet allows students to access information from multiple perspectives in a nonlinear format. Neither is the university library the major resource for housing materials.

Libraries from all over the world can be accessed instantaneously via the World Wide Web. Art, Science, Anthropological, History, and other museums can be accessed to reveal paintings, artifacts, and other interesting items that are only housed at particular sites.

Internet

Students are using the Internet to access various directories that take them to numerous data bases. These data bases enable students to sort through information and note category relationships. They can be used as research tools to solve specific problems and to publish their papers (Alvarez, in press; Alvarez & Rodriguez, 1995). Some data bases are built from student input, then used interactively.

World Wide Web

Our TSU homepage has links to other web sites. The Department of Teaching and Learning has a link that describes their undergraduate, master's, and doctoral programs. The Center of Excellence in Information Systems has a link that describes their research programs. Dr. Helen Chen has established a library link that directs viewers to multiple library networks.

Electronic Mail (E-mail)

Students are also using electronic mail (E-mail) to communicate with other students in similar content classes. For example, our undergraduate and graduate students enrolled in the content literacy classes are communicating with students at several universities throughout the country who also are enrolled in this type of class. The dialogue relates to the content of the class: various viewpoints and exchanges take place.

Interactive Video - Multimedia Hypertext Documents

Professors are turning to hypertext to stimulate learning within their students. One professor (Barnes, 1994), designed a hypertext that contained concept maps and a companion laser video disc to accompany the teaching of *Hamlet* with undergraduate students in an English literature course. The idea was that this interactive technology enabled students to gain more insight from lectures and impose their own framework with the content. The concept maps served as navigational aids to guide students through the multimedia document. Barnes (1994) points out that literature is a highly complex and ill-structured domain. Despite the literary features that appear universally in books (e.g., setting, characterization, initiating event, character response, and so forth), these structural elements do not confine literature in a narrow context. The study found that the experimental group in an undergraduate Shakespeare course outperformed a control group on objective measures after exploring a multimedia hypertext document.

In the area of teacher education, interactive videodisc bases cases are being used by preservice and inservice undergraduate and graduate students in several universities to learn more about classroom environments (see Risko, 1995, 1992, 1991; Risko, McAllister, Peter, & Bigenho, 1994; Risko, Yount, & McAllister, 1992). These videodics were developed by Professors Risko and Kinzer to better inform preservice and inservice teachers to problems and unexpected situations that arise in classrooms. The idea is to connect and apply knowledge derived from college classroom experiences to authentic situational contexts.

Collaborative university/school partnerships have resulted in several innovative productions of video and compact discs. A five-year case-based literature project with secondary teachers and their students culminated in the development of a videodisc. This videodisc was developed by teachers for their students instead of by outside professionals (see Alvarez, 1993; Alvarez, Binkley, Bivens, Highers, Poole, & Walker, 1991). In another study (Alvarez, in press; Alvarez & Rodriguez, 1995), a CD disc was produced using the teacher and his students to explain least string analyses. Having teaches develop video and compact discs to be used with their students enables students to identify with facts and ideas of the subject being studied.

In the Methods Laboratory in the College of Education, Professor Dickens has designed a program in which preservice and inservice students can learn how to use hypertext to develop engaging contexts for their students. Such a program promotes better understanding of the content by preservice and inservice teachers in planning and designing the hypermedia document; while simultaneously enhancing their students' knowledge of ideas and objects by allowing them to explore their environment. The Methods Laboratory is available for faculty to develop and incorporate multimedia documents into their teaching.

Exploring Minds Interactive Network

Exploring Minds (http://exploringminds.tsuniv.edu) is an active electronic venue for professors, teachers, researchers, and students to reflect, negotiate, and evaluate the teaching/learning process. It is an interactive electronic network that is password protected and contains provisions for teachers, professors, researchers, and students to communicate about their class work and/or research agendas. The network contains several interactive tools for posting notebook entries, constructing hierarchical concept maps and **V** diagrams, and storing information (print and nonprint) in a backpack (portfolio). Exploring Minds is a self-contained system that encapsulates transactions between students and learning stakeholders over the Internet interactively.

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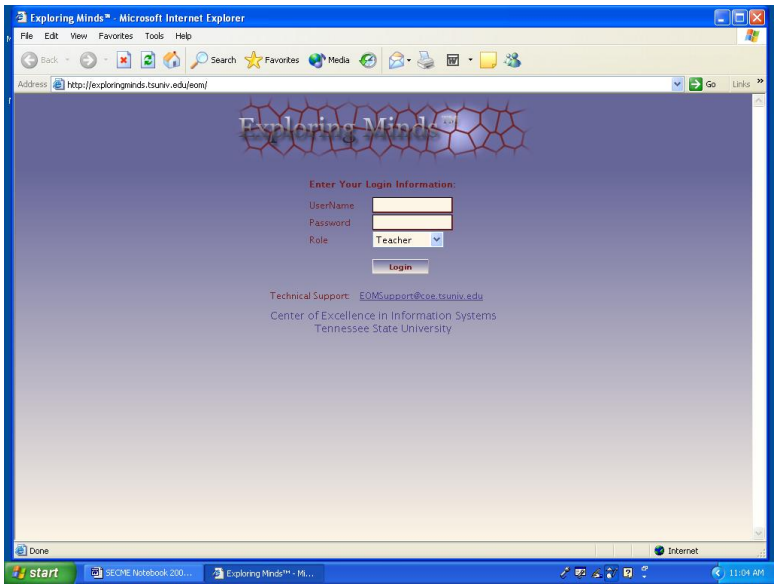
(portfolio). Exploring Minds is a self-contained system that encapsulates transactions between students and learning stakeholders over the Internet interactively.

Password Protected

Entering the Exploring Minds Network (http://exploringminds.tsuniv.edu) necessitates having a password and username. The teacher, coordinator, or Director enters the names of persons authorized to access this system.



You will need to contact me for a Teacher Account. Once you are given a Teacher Account enter your password and username and then click on TEACHER. This will give you access to the Exploring Minds Network.

This entry permits students, teachers, coordinators, research candidates, guests (invited as a classroom resource), director, and parents to access and view the components of the network. Parents are permitted to view their own child's records of progress and attendance.

Management System

The management portion of Exploring Minds site is divided into four consoles: Director, Coordinator, Teacher, and Students. Researchers at TSU's Center of Excellence in Information Systems and those at affiliated colleges and universities along with teachers and their students manage their own respective students. The Teacher Console enables either the teacher or researcher to assign passwords and usernames, control incoming and outgoing communications

between students, and have access to student concept maps, **V** diagrams, electronic notebook entries, and portfolios. Students, once given a password and username by their researcher or teacher are able to construct concept maps, **V** diagrams, enter notations and thoughts into their electronic journal, notebook, and enter video clips, photographs, journal articles, drawings, simulations, and any other relevant information (print or graphic) into their own portfolio or library. Any portion of a portfolio can be shared with other students within a given college or university, or school with students at another affiliated colleges, universities, or schools if the researcher or teacher gives permission.

When students want to submit their concept maps or **V** diagrams for review by their teacher and researchers they submit them directly electronically via the Internet using their account on Exploring Minds. Students also have a biographic file to enter any pertinent information about them including a photograph. The researcher console enables university educators, researchers, and scientists to access student entries, and respond by giving feedback to student maps, **V** diagram and journal entries. When students log onto the Welcome portion of the web site, they are alerted to feedback responses. They click on their journal, concept map or **V** diagram and view the incoming information. When reviewing either their concept map or **V**, the teacher simply records comments directly on the concept map or highlights each epistemic element arrayed on the **V** diagram, records their comments, and sends them to the student. Upon accessing the **V**, the student views the person whom made review comments, moves the cursor over the elements containing check marks and clicks on the relevant elements arrayed on the **V** that appears revealing the comments made by their researcher or teacher. Teachers, professors, and researchers have access to all the features and metacognitive tools available to the students.

Administrative Tools is designed for teachers, coordinators, and director to create, edit, and delete groups (classes) or subgroups within groups with participating members. The Grade Book section permits access to student or participant records of transactions that occur during a semester or year (e.g., assignments, V diagrams, journal postings, examinations, etc.). There is also a My Profile section where students can change their password and username, enter relevant information (e.g., address, telephone number), and anecdotal information including a photograph. Only anecdotal information is made public and can be viewed by any participant. The Profile allows the teacher, coordinator, or director to access participant records.

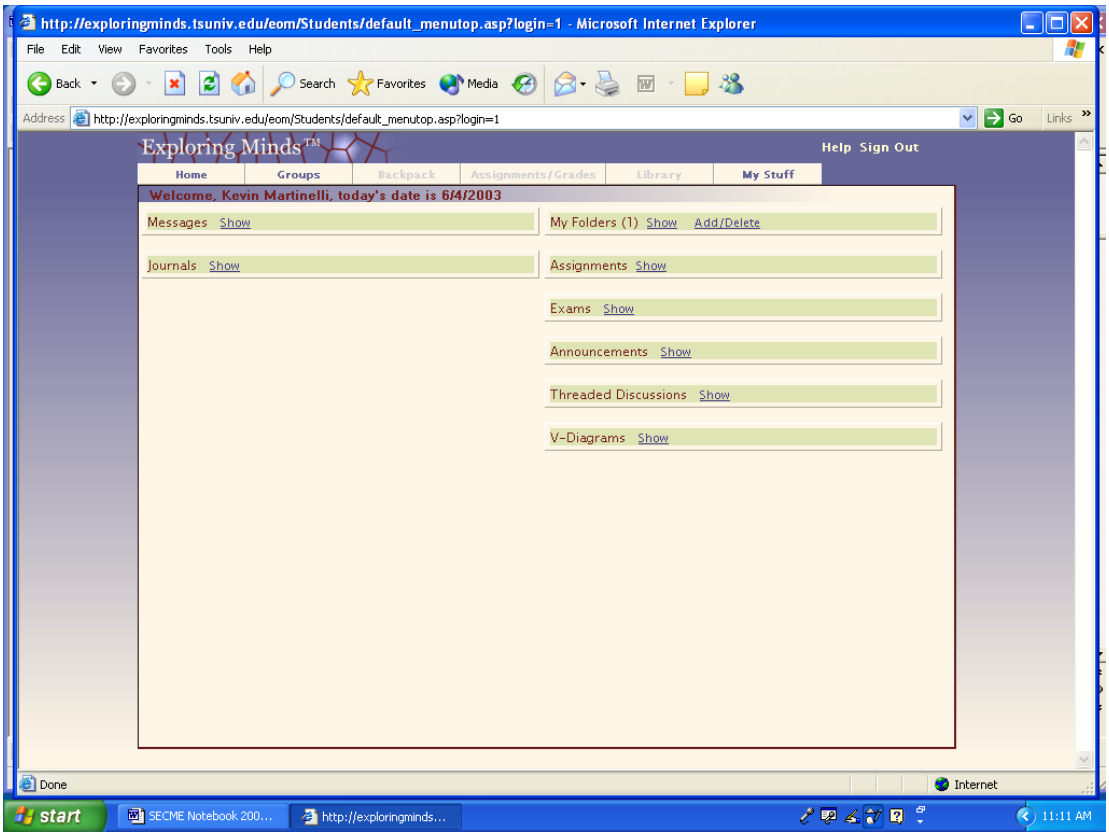
Home Page

Once logged into the restricted section a home page appears that contains newly posted items arranged by group (class). These are messages, journal entries, announcements, threaded discussions, and attachments. Your name will appear at the top of this page.

Once each message or journal entry is accessed, the teacher or student is taken to the Communications section where the message appears and the option of writing a response that is sent directly to the initiator is accomplished. Likewise if an attached document or **V** diagram is sent, they are accessed and viewed in the Communications section of the site and can be printed as a hard copy.

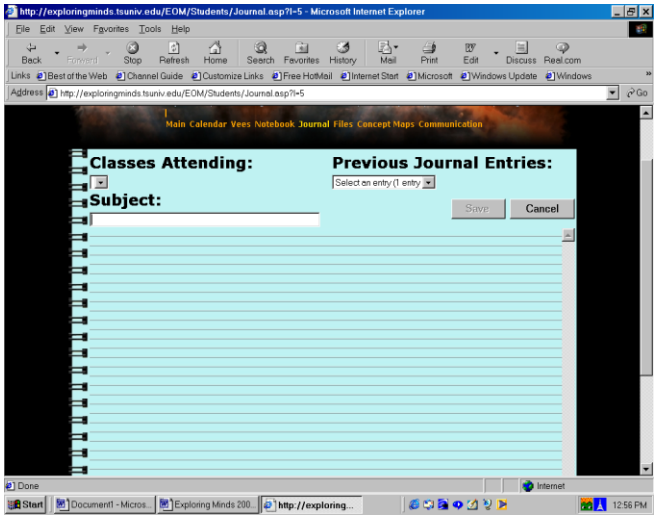
Every message, once viewed and responded to, disappears from this screen and

automatically stored in the Grade Book section under Records. These records are arranged by groups and students alphabetically and each individual's entries can be retrieved by clicking on the name.



Electronic Journal

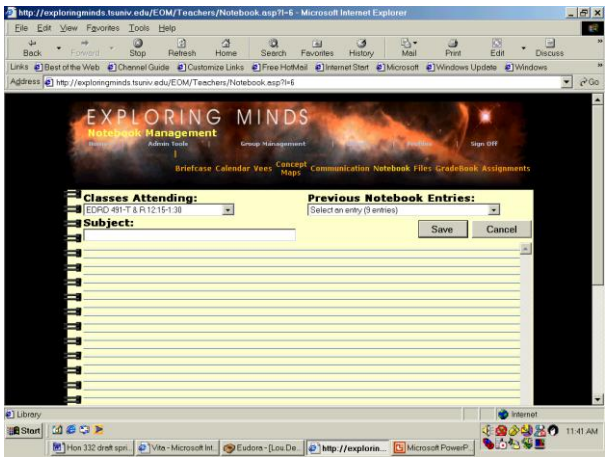
A prominent feature of Exploring Minds is a reflective portion containing journals for students to enter their thoughts and feelings of course content, and an exchange section whereby ideas can be posted and feedback received from professors, researchers, and teachers.



Once comments are made and sent back to them, the students then read the response by clicking on the message appearing on the Welcome page. A record (date and time) of each transaction is automatically noted in the students' journal section and also in the journal of the teacher or professor.

Electronic Notebook

A notebook is provided to better organize notes taken for a class, a report, or paper. This notebook acts as a storage area and serves the same function as does a regular notebook. The difference being that it can be accessed through wireless communication systems such as a laptop computer and information can be gathered from various Internet sources and locations.

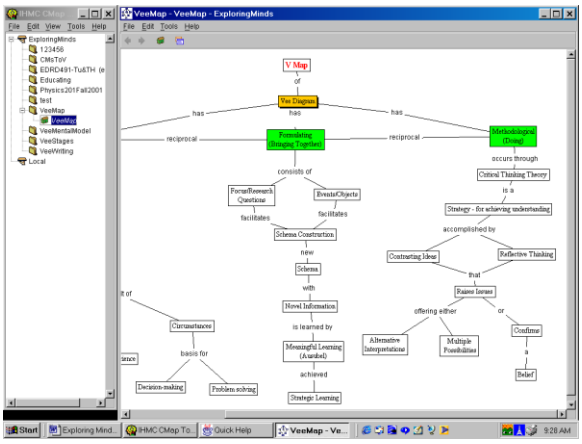


Concept Mapping

Exploring Minds contains an interactive concept mapping component that reveals a visual representation of student thought processes with feedback directly placed on each respective map. A hierarchical concept map is a visual representation of an individual's thought processes. It is a word diagram that is portrayed visually in a hierarchical fashion and represents concepts and their relationships. Students, teachers, and researchers use concept maps as a way to visually display and share ideas using software such as Inspiration 6.0 or CMap Tools. Exploring Minds uses CMap developed at the University of West Florida. Maps developed by participants in our program are stored and accessed on our Exploring Minds server.

Hierarchical concept maps enable students to reveal their ideas with a theme or target concept under study. Once the map is reviewed their teacher, professor and/or a researcher send their comments to the student where it is downloaded and the comments are read. The student views these comments appearing on the map, reflects on these comments, and then revises the map. The map is then redrawn and submitted again for review. When students redo their concept maps, they reconceptualize their ideas and these ideas become more meaningful.

These maps are very helpful for negotiating ideas not only with the teacher, but also with one's peers. The connections shown on the map together with the linking words determine the extent to which ideas are meaningfully represented.



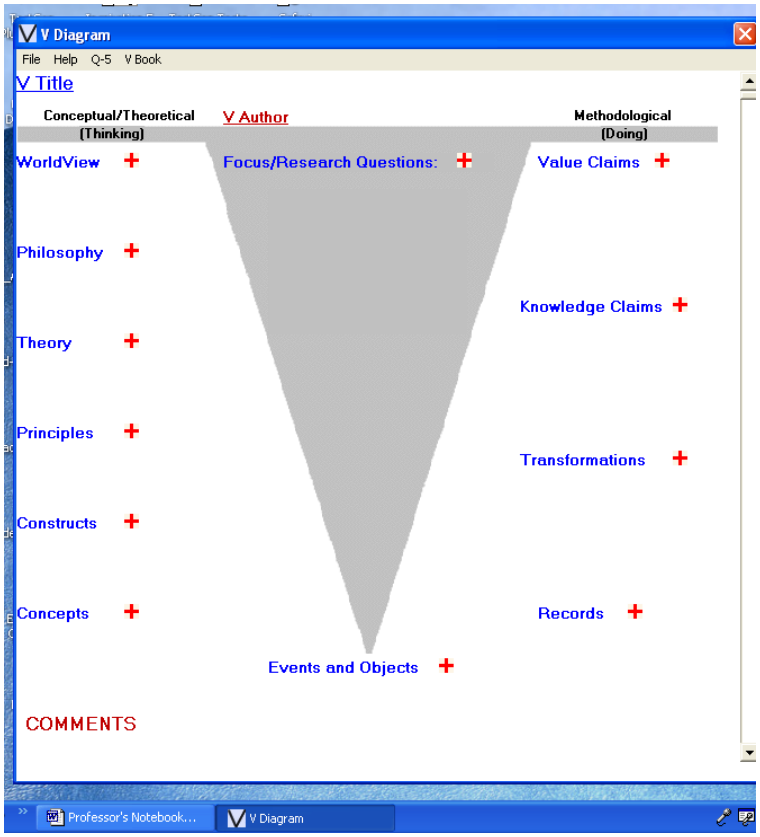
This map contains feedback the student receives and uses in the reformulation of the map. This map reconstruction is an important part of the learning process as it enables the student to rethink ideas and display them again in a new display. Together the teacher and student negotiate the ideas revealed by the map into a coherent and meaningful record.

Interactive V Diagrams

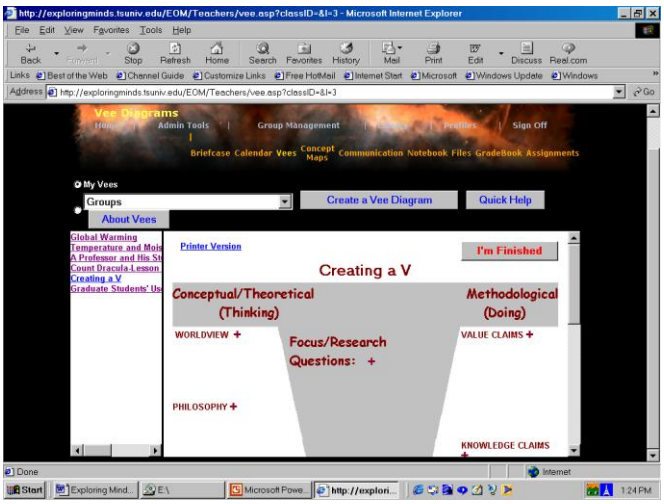
The **V** heuristic was developed by Gowin (1981) to enable students to understand the structure of knowledge (e.g., relational networks, hierarchies, combinations) and to understand the process of knowledge construction. Gowin's fundamental assumption is that knowledge is not

absolute, but rather it is dependent upon the concepts, theories, and methodologies by which we view the world.

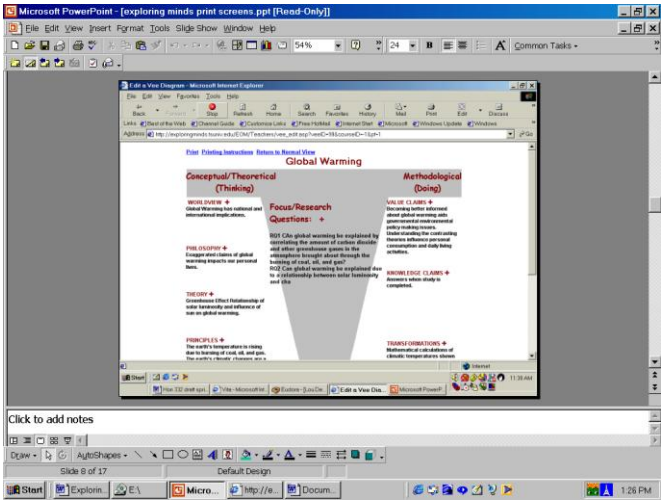
To learn meaningfully, individuals relate new knowledge to relevant concepts and propositions they already know. The **V** diagram aids students in this linking process by acting as a metacognitive tool that requires students to make explicit connections between previously learned and newly acquired information. The **V** diagram is shaped like a "**V**" and elements are arrayed around it. The left side, conceptual or thinking side, of the **V** displays *world view*, *philosophy*, *theory*, and *concepts*. The right side, methodological or doing side, has *value claims*, *knowledge claims*, *transformations*, and *records*. *Events and/or objects* are at the point of the **V**. Both sides are interactive; not exclusive [5, 6].



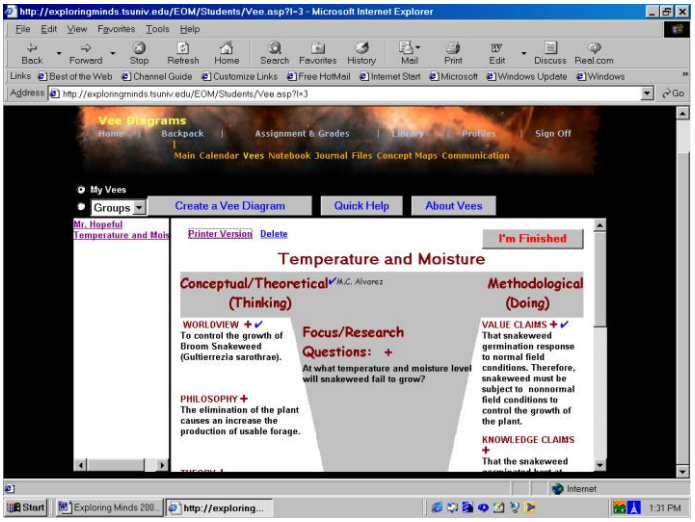
The Interactive **V** Diagram [7] section of the network has a Quick Help menu and a link describing the **V** components with explanations of the epistemic elements. Also included are instructions for entering information on the **V**. Information is entered onto the Interactive **V** Diagram by clicking on the respective field of the arrayed elements and then typing the data.



Once the fields on the **V** template have been completed, the user can review the entries and then electronically submit the information to our base site as an attachment.



When received by the teacher or professor, the **V** diagram is reviewed and comments are made directly on the submitted **V**. These comments are then sent back to the sender who is then able to read the comments by the reviewer.



The name of the reviewer appears at the top of the **V** with a color-coded check mark. There can be as many as four reviewers on one **V** diagram. The initiator of the V looks on the **V** and by either moving the cursor over the check mark or clicking on the "+" is able to read the remarks. These remarks can be printed and incorporated into a revised version of the **V** and sent again to the reviewer.

Backpack (Portfolio)

A backpack (portfolio) section serves as a repository for student work in progress and contains importation of video, simulations, articles, or any type of pertinent electronic transmissions that is needed by a student.

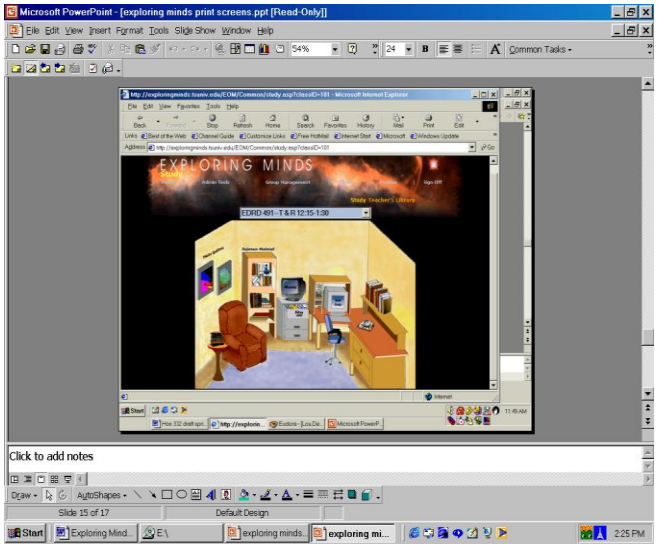
Briefcase

The teacher has a briefcase from which to navigate the interactive features of the Exploring Minds Network.

The features contained in the briefcase that are linked are: grade book, calendar, notebook, journal, **V** diagram, communications, files, and concept map.

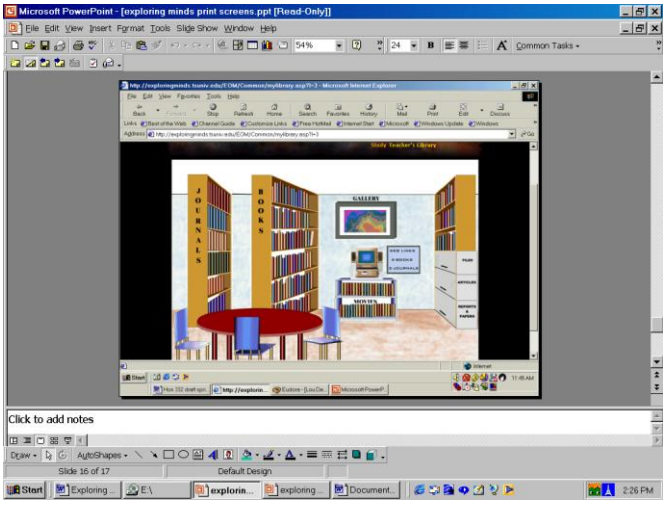
Teacher and Student Study

Both the teacher and the student have a study. The study provides a venue by which the teacher creates the reference materials needed for a particular class. Sections of the teacher's library include the files section, reference documents, photo gallery, electronic journals, URL links to relevant sources, movies, articles, and reports. The students can use access these sources and include them in their own library. These items are then stored in the Teacher Library for student access and retrieval. Likewise, students can use the study and have their own library to collect information and materials for a project, report, or research paper.



Teacher Library

In this Teacher Library the materials and references are displayed for student access and retrieval. By clicking on each respective category a display of the requested materials appears and can be viewed or downloaded.



Student Library

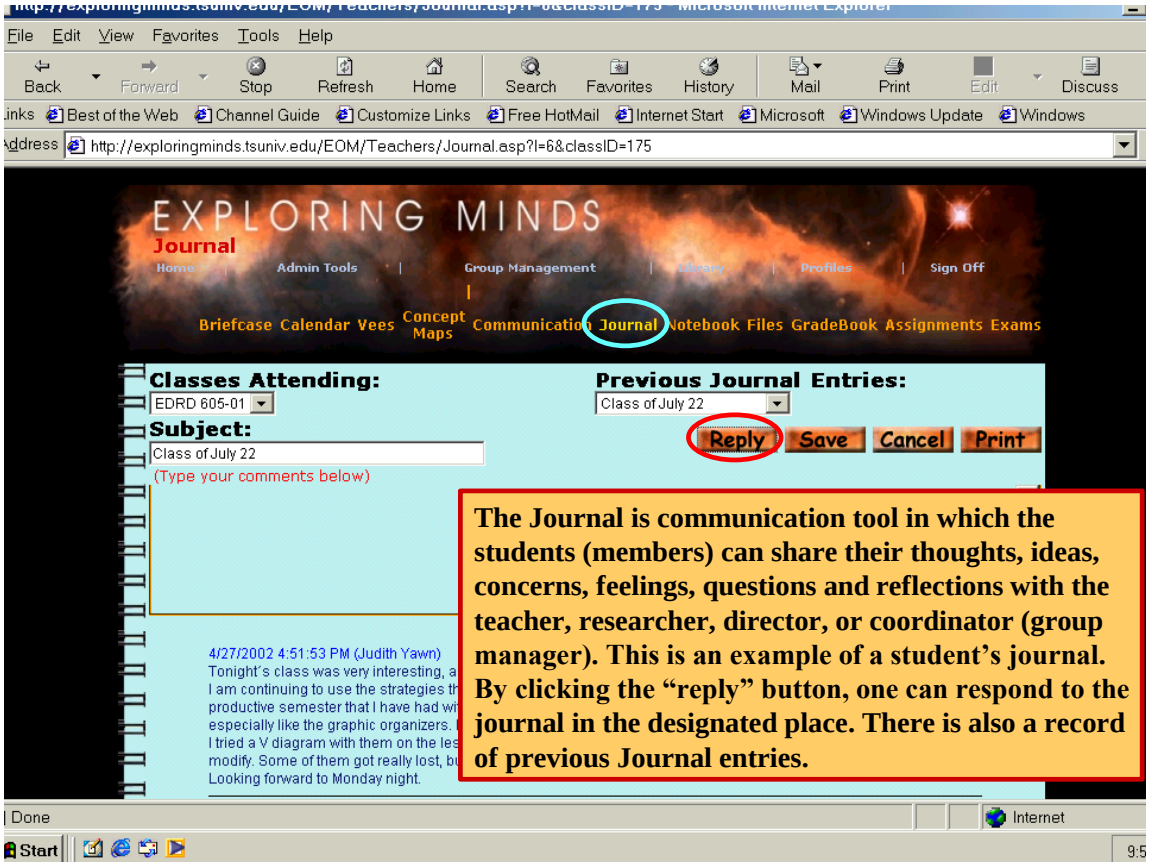
This is a library for the student to store information for personal use. This area enables the student to categorize pertinent information relevant to a specific work within a class or research project.

Exploring Minds provides faculty with a system to communicate more effectively with their students. In addition to the management features (class assignments, class roll, personal calendar, announcements, grade book functions, and course material), the teacher or professor is able to react to student notebook postings on a regular basis and thereby monitor students' thoughts and feelings instead of waiting for end-of-the-semester evaluations. These interactive dialogues, together with visual displays of the concept maps and **V** diagrams, serve to negotiate the learning process and better serve meaningful understanding between the professor, teacher, and students during the semester or school year.

The uniqueness of Exploring Minds is the active engagement that occurs between teachers, professors and their students afforded through the use of the journal, concept maps, and interactive **V** diagrams. In essence, teachers and professors are active learners with their students, and facilitate the learning process by guiding students in their inquires, evoking discussions, and involving their students with other affiliated schools whose students may be engaged in similar research/study topics.

The sharing of ideas using this network has been an integral educational component with high school and university students and their teachers/professors in our Explorers of the Universe program. Co-authored papers have resulted from conference presentations where teacher and student voices have been heard concerning their research endeavors with case-based instruction. Exploring Minds provides a learning context that encourages students to *think about learning* and enables them to learn principles instead of learning prescriptions that they may not understand or partially understand.

Electronic Journal:
Recording Thoughts and Feelings



JOURNAL PROCEDURE FOR STUDENTS:

1. Go to Group and click on Course Designation (e.g., EDRD 605).
2. Then click on Backpack and click on Journal.
3. Enter the Class Session you attended in SUBJECT.
4. Type your thoughts and feelings about this session and its relevance to your class/school environment.
5. When you have completed your entry click on SAVE at the top of the page. This automatically sends your message. **CAUTION:** Complete your entry at one sitting. Leaving your computer and then returning later does not permit you to send the message. You will need to redo your message again.
6. Your saved message automatically posts a date and time and a record of each of your entries is filed to our database.

7. To exit the Exploring Minds Network click Sign Out at the top right hand corner of the page.

NOTEBOOK PROCEDURE FOR STUDENTS:

Students and Professors can use the Notebook section to keep notes of class session or ideas that you want to maintain for your class.

1. Click on Backpack.
2. Then click on Notebook.
3. Name your entry in the SUBJECT.
4. Enter your notes.
5. Click SAVE.

COMMUNICATION PROCEDURE FOR STUDENTS:

To communicate with another member(s) in the same class:

1. Go to Backpack.
2. Click on Communication New Message.
3. Click on Select Recipients and then select the person you want to receive a message. Click on the Single Arrow and move this person to the right box.
4. Then Click DONE.
5. Enter your SUBJECT and Write your message.
6. When you are finished click on Send Message.

Journal writing allows you to share thoughts with your students, researchers/teachers. These notations provide a sharing and exchanging of views helps to promote a better and clearer understanding with topics of interest and subject-matter being studied. Students are encouraged and provided with feedback from which to redraft their papers and complete a better-organized and coherent writing. The professor is able to exchange ideas with the student by writing responses in their journal.

Reflective Writing Journal

As the name implies, reflective journals give students an opportunity to think about what they are reading or listening to in an oral presentation or discussion. The student evaluates the information by asking: (1) How important are these facts and ideas? (2) Can these facts and ideas be related to prior knowledge and experience? and (3) How can these facts and ideas be applied to other situations? Notations are made concerning the ideas read and/or discussed together with ideas that are inspired from this reading, discussion, or presentation.

QUESTION: What do you know about this topic? What don't you know about this topic?

Some examples of how this type of journal can be used:

1. Reflect upon what you have read in the textbook, journal article, report, and write these musings (reflections) in your journal.

2. Write your thoughts and feeling concerning what is transpiring during each session you attend. **DO NOT** write a review of what took place during the session

Reflective journals contain notations based upon careful thought and inquiry.

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CHAPTER 7
PLANNING SUCCESSFUL READING ASSIGNMENTS[6]

There are many ways to introduce a topic for study. One of the most common is merely to "assign" a chapter or a section of the textbook "for study tomorrow." There may be some advantages in making such a chapter assignment. It requires no preparation by the teacher; takes very little "valuable" class time; in fact, such assignments are frequently announced after the class period has ended. But, since little or no effort has gone into "assignment giving," little, if any learning should be anticipated, confirming the old saying, "What you sow, you reap."

The reading assignment is that essential part of content-area learning in which professor and students discuss (1) *What is to be read*? (2) *With what materials*? (3) *Why*? (4) *How*? (5) *How long is the assigned material*? and (6) *When is it to be read*?

Components of the Reading Assignment

1. **Preparation: "Stage-setting", and Predicting**

Emphasis should be placed on the idea that we are discussing assignments in reading materials, and that these may be in other sources as well as in textbooks. However, we repeat that textbooks are the prime medium of instruction in most academic areas. We are not debating whether or not this is good but are merely recognizing the facts of classroom life.

What Is to Be Read?

A good textbook is sequential in organization and format; therefore, reading assignments, as parts of this sequence, do not exist in isolation. An essential principle of learning is that *all learning is based upon past experience*. The reading assignments, therefore, frequently can capitalize on prior knowledge. The reading assignment may be based upon segments of a larger unit of work. In any event, it deals with a specific portion of a whole concept and probably has little relevance by itself.

Readiness for what is to be read may be accomplished in many ways; for example, by a field trip, or demonstration; through a presentation given by means of a recording, filmstrip, videotape, or motion pictures; by posters; through a talk by an expert, an experiment, or a dramatization; by means of a mock-up; by a class discussion. In any case, it takes planning by the teacher, preferably with the help of the students.

The assignment must be specific. It must be more than just an allotment of pages. It

[6]This chapter is primarily attributed to ideas formulated by Robert C. Aukerman.

must deal with a topic, a concept, an idea, a philosophy, a movement, a process, a genre. Many minutes before the pages to be read are indicated, the teacher should *prepare* the class for the assignment. The first part of the reading assignment deals with *what*, not *which pages*. A psychological "set" must be developed by the teacher and students as an introduction to the assignment.

2. **Planning Effective Reading Assignments**

What Materials Are Available?

Both teacher and students must know that sufficient and appropriate materials are available to ensure some degree of success for each learner in completing the assignment.

Vague assignments, such as "Next class period, try to see if you can find out something about computerized gardening," are violations of principles of learning.

An assignment like this reveals that the teacher is not sure whether or not any materials exist on the subject. There is no direction as to how much should be read, or where the information may be found. It does provide for individual initiative, but the great majority of a class would not even undertake such an assignment, and, for several very valid reasons. First, many middle and secondary school students are bus students, and when they arrive home they are far from library resources. Second, most students do not have encyclopedias or other reference works in their homes. Third, most students do not have parents, neighbors, or acquaintances who are authorities on academic subjects. Fourth, if the assignment does not grow out of the intrinsic interests of the students, it cannot be expected that they will make special efforts of research. Fifth, and perhaps most important, is the fact that such a vague assignment cannot be successfully undertaken by the majority of the class because there is no indication of *where* or even *if* the relevant materials are available.

Every reading assignment, therefore, must provide the materials for its completion. The learners have a right to expect the teacher to discuss these questions with them: What materials are available? Where may they be found? How is the assignment to be done? How long is the assignment? When is it to be completed?

3. **Making A Reading Assignment Meaningful**

Why This Assignment?

Every reading assignment has an objective. It may be to cover a quota of pages; it may be to acquire certain facts or skills; or it may be to cover part of the sequential development of a theme or concept.

The answers to the question "Why?" will indicate several things about the learning that is anticipated in any class. First, is the reading a natural outgrowth of a sequence of learning experiences which provide a foundation for the next step in learning? Second, does the reading clearly have some inherent value? Third, will its completion provide the learner with some knowledge, skill, attitude, or facts of potential value? Fourth, what are the extrinsic rewards for reading the material?

If the learner is to develop a productive and fulfilling self-concept, it is absolutely necessary that s/he have some assurance of success in reading. Any reading assignment that ignores this basic need or contains elements of failure is self-defeating and should never be given. If students understand how an assignment fits into the sequence of learning and of what value it will be to them, they are most likely to handle it successfully. Students respond to honesty in the presentation of the *raison d'etre* for a reading assignment. Before the students begin the task, they should be in possession of reasonable answers to the questions noted above, which from his personal point of view would take on some such phrasing as the following:

* Why does the professor want me to do this reading?
* How does it fit into the larger unit of learning?
* How will it help me? Now? Later?
* What's in it for me?
* What if I don't do the reading?

Such questions should be "learner-centered," for it is a principle of learning that learners should identify with each learning task and approach it from the standpoint of how it relates specifically to them.

4. Establishing Parameters

How Long Is the Reading Assignment?

The common textbook assignment is closed-ended and usually bounded by pages: "Read pages 114 through 118." This is ineffective. But many an open-ended assignment - such as "See if you can find out anything about computerized gardening" - is just as ineffective. Both of these examples leave much to be desired. The former is so highly structured that it allows for no differences in motivation. The latter is such laissez-*faire* approach that nothing is defined at all, and, consequently, the teacher must be ready and willing to accept it if no commitment at all ensues.

Students have been conditioned to the idea that a reading assignment has a beginning and an end. Some defined amount should, therefore, be indicated as the minimum to be read. If the professor is working on the assumption that there should be room for individual differences in interest, motivation, and time available, the students should know this too. If there is provision for open-ended "enrichment" work, the students will learn that they can achieve extrinsic

rewards, such as higher grades, for doing it. They can also know that completion of the minimum amount of reading will (all other things being equal) result in a specific "average" grade.

Like any task, reading in a content area demands a certain amount of time, and time is a limited resource. The amount of time that a teacher asks a student to invest in a particular reading must be reasonable and in keeping with the importance of the task.

5. Determining Closure

When Is the Reading to Be Completed?

Short-term reading assignments are, by their nature, related to specific day-to-day material taught in the subject-matter classroom. Consequently, such assignments can be short and to the point; the materials needed should be easily obtainable; and an assignment should fall the day when it is most relevant to what is being taken up in class.

Long-term reading assignments naturally call for expenditures of time and effort over longer periods, and are reserved for materials that cannot and should not be read overnight. To "give" a long-term reading assignment is not enough: short-term goals should be built into it - that is, certain achievements should be called for at intervals, ensuring a continuous effort as part of the developmental process inherent in the goal of the assignment.

Just as reading assignments should be reasonable in length, so also should they have reasonable terminal dates. The length, difficulty, importance, relevance, and terminal date of an assignment are all related.

Planning and PrePlanning and Preparation of the Reading Assignment

Although the ideal reading assignment appears to evolve from a discussion or needs which emerge during a lesson, good reading assignments, like all learning, do not just happen; they are *planned*.

To be sure, there is the occasional inspired outgrowth of a lively discussion that leads to a spur-of-the-moment assignment with special relevance and immediate motivation. This is as it should be, and when it happens, it calls forth the rich resources which distinguish the master teacher from his/her colleagues. It is more realistic, however, to realize that teachers usually will need to invest many hours of time in planning and preparing good reading assignments. Once done and proven successful, the assignment planning form can be kept for future use and/or explanation.

No assignment can be completed successfully if the appropriate reading materials are not available. Good planning involves a tabulation of the materials available: How many? What kind? How difficult? How accessible? This is a responsibility which the teacher cannot shift to someone else, although other personnel may help locate, acquire, and prepare relevant materials.

In preparation for the ideal reading assignment, the teacher, with the help of the library media specialist, should make an annotated list of materials and have it available to the students. The specific objectives of each assignment determine the nature of the reading materials that will appear on such a list. The materials become the *what* that results from a determination of *why*.

It is practical to recognize the fact that method is more often dictated by *available* materials than formed with reference to an unlimited amount of appropriate materials.

A reading assignment is successful only to the extent to which it enlists a commitment from the learner. Commitment can be achieved only if there is open communication between the learner and the professor. Educational theorists have suggested that planning by both professor and students is ideal. This may be true, yet the realities of classroom teaching often make such an ideal impossible to realize. This does not mean, however, that the professor becomes simply an assignment-giver. On the contrary, communication with the students will provide common understanding of objectives, materials, methods, expectations, limitations, and rewards. In this manner the reading assignment is "learner-centered" even though it is prepared by the teacher. Only when lines of communication are open can this be achieved.

Giving the Reading Assignment

We have identified at least ten features of value in the process of "giving" the reading assignment. The assignment should, for example, contain the elements discussed so far (What? Why?, etc.). We may envision the assignment, practically speaking, as a segment of the learning process prepared by the teacher. The following twelve suggestions will help make it successful:

1. Students should keep notebooks such as a reflection or reaction journal that allows them to think about and react to the lesson and the assigned readings, labs, etc.

2. The objectives should be clear, reasonable, specific, and pertinent. The objectives of the professor and those of the students are not necessarily the same, but both should be understood by everyone. This is accomplished through dialogue. It is unreasonable to expect students to become involved in a learning project if its objectives are not their own.

3. List the specific intrinsic and extrinsic outcomes of an assignment. They are to be predetermined through discussion by teacher and students.

4. Provide an adequate allotment of time for completion of the reading.

5. Refer to certain vocabulary in context.

6. Provide students with a duplicated list of readings available, indicating where they may be located.

7. Provide sufficient alternatives and adequate readings to allow choices based upon differences in interest and motivation; ability, skills, intelligence, experience, time available, and degree of commitment.

8. Indicate what will be done with the completed reading assignment. Students want to know that they are not just doing busywork.
9. Provide guidelines in the form of directions, questions, or both, giving assurance that the reading will be done as a cognitive process.
10. Be sure that there is complete understanding before the students are launched on their own.

The length of time spent in "giving" the reading assignment varies according to the nature of the materials and how new they are to the students. If there are many different materials involved, it may take one whole class period. On the other hand, if the reading is merely an extension or refinement of a skill already learned, it may take only a few minutes of demonstration and emphasis on transfer of training. A reasonable amount of time should be allotted, since this should never be a hurried project. It should be the culmination of a class period and the outcome of a lesson, and therefore anticipated as the next sequential step in learning. When done in this way, the giving of the reading assignment is the hallmark of a well-organized and gifted teacher.

Planning Your Course Assignments

I. Familiarize Yourself with the Textbook

A. Read the table of contents to see how the textbook is organized.

1. Is the textbook organized by unit, chronologically, thematically, etc?
2. Does the organization of the text need to be reorganized to meet your goals and objectives?

B. Read the textbook from beginning to end.

1. **While reading:**

a. Make notes on what you can do to make the ideas more meaningful for the students in your class.
b. Devise symbols to mark in your textbook where you wish to clarify, elaborate, substitute, or skip over the information.

c. **Ask yourself questions:**

1) Ask yourself: Does everything in a given chapter need to be taught? Can I leave out some portions of the chapter and replace them with other readings (e.g., essays, documents, other texts, transcripts of television or film documentaries, a play, or the lyrics of a musical piece that represents this area of study)?

2) What examples can I show?

3) What demonstrations do I need to conduct?

4) What resources are available (e.g., people in the community, historic landmarks, field trips, artifacts, etc.)?

5) What instructional strategies can I use to make this portion of the text more meaningful (e.g., survey technique, concept mapping, reading/study guides,**V** diagrams, graphic organizers, etc.)?

6) How can I clarify the ideas presented in this major heading?

7) What are some other sources that I can draw upon to further elaborate the major ideas of the text (e.g., other texts, essays, other disciplines, audio and video tapes, films, records, documents, sculptures, art, library references, Internet, etc.)?

2. Conceptual Linkages

1. What links can be made with the information appearing in the text and the background knowledge and experience of my students?

2. What do other books, articles, and essays say about the topic or theme?

a. Would this information involve my students in learning the ideas in the textbook?
b. Can these supplementary materials be read and understood by my students?

3. What are some instructional strategies that can be used to clarify conceptual ambiguities appearing in the text (e.g., concept maps, Vee diagrams, reciprocal

questions, etc.)?

II. National Accreditation Boards and Standards, State, University Requirements.

A. How can I incorporate these requirements into my lessons and assignments?

1. What are the **specific facts** my students need to know?
2. What **specific skills** do they need to learn and use?
3. What **specific concepts** do they need to learn as a result of this course?

B. How can I teach these facts, skills, and concepts meaningfully rather than through rote memorization?

III. Evaluation

A. How can I evaluate my students' performance?

1. By devising your own pre-and posttests for topics of study, rather than relying on textbook author/publisher tests.
2. By including writing samples, projects, performances, and other assignments into the evaluation process.
3. By including questions that allow students to map their answers; keeping in mind that no two student maps will reveal exactly the same information on a given topic of study.

B. How can I evaluate the significance of my assignments and lessons?

1. By having students comment on what they liked about the lessons and assignments. Ask them to state the reasons why they liked the activities.
2. By having students comment on what they didn't like about the lessons and assignments. Ask them to state the reasons why they didn't like the lessons or assignments.
3. By having students express their ideas on how the lessons and assignments can be made more meaningful for them.
4. By having students evaluate the textbook and supplementary readings of the course.

The ideal reading assignment has a purpose. It indicates why the student is to do it. It is related to the general needs and objectives of the students and is relevant both to the developmental learning of the class and to the needs of each student.

The best assignment comes as an outgrowth of the day's lesson. It should be developed in cooperation with the class, although it has been planned by the professor. It must relate to the

work that precedes it and be part of a larger unit of learning.

It must be specific regarding what is to be done, how much is to be done, how long a time can reasonably be spent on doing it, and when the work is due.

The reading must relate to the self-concepts and interests of the learners. It should include elements of potential and actual inherent value, as well as extrinsic rewards.

The professor should provide access to the reading materials for accomplishing the assignment.

We provide the following *Reading Assignment Planning Form* in the hope that it is helpful in making the assignment a good teaching device.

READING ASSIGNMENT PLANNING FORM

_____

1. **What is to be done?**

List the "readiness" activities:
Field trip to_____
Demonstration of_____
Experiment by_____
Recording of_____
Videotape, filmstrip, or film on_____
Posters or mock-up of_____
Prepared by_____
Talk or discussion on_____
Given by_____
Dramatization of_____
Done by_____

The outcome of these activities is to be a *decision*: To do what?

2. **With what reading materials? Where are they to be found?**
Textbook, pages_____

3. **What pre-reading introductory activities will be used?**
_____

4. **What involvement activities will be used with the students?**

Concept maps? _____
V diagram? _____
Reading/Study Guides? _____
Other? _____

5. **How may the reading be done?**
   Alternative 1_____
   Alternative 2_____
   Alternative 3_____
   Alternative 4_____
   What study skills are to be used?
   survey?_____
   scanning?_____
   skimming?_____
   notetaking?_____
   special vocabulary?_____

6. **How long is the reading?**
   Minimum length_____
   Average length_____
   Maximum length_____

7. **When is it to be completed?**
   Date for part 1 (if any)_____
   Date for part 2 (if any)_____
   Final date(s)_____

8. **Dialogue on the completed reading**.
   Is discussion anticipated? Comments:
   _____
   _____
   _____

9. **Results of the reading**.

   Transition to other reading, discussion, or activity.
   _____
   _____
   _____

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