A FEW LESSON PLANS FOR THE COURSE

THESE LESSON PLANS ARE BEING USED IN THE TRIAL COURSE FOR THE MEC SEEK DEPT JULY 2011 – Developed by Dr. Nancy Oley[1].

Course instructor: Ms. Sophia Smart

(Valedictorian 2010 class – awards winner for undergraduate research with mentorship Dr. Umesh Nagarkatte on Tutorial Management System using TOC)

LESSON PLAN 1—TOPIC: Introduction to the Workshop

I. Aim: Introduce students to the Theory of Constraints/Thinking Tools and how TOC can help them in their courses and personal lives.

II. Essential Questions
- A. How can this workshop help students?
- B. What is TOC/TP?
- C. How can we characterize bothersome issues so that they can be addressed effectively?

III. Teaching/Performance Objectives to achieve the Aim.
- A. Students will become comfortable with each other and the professor through warm-up exercises.
- B. Students will understand the expectations of the professor by beginning their portfolios.
- C. Students will understand the purpose of the workshop, its relationship to the Math course and to their personal lives by seeing examples of what TOC /TP can do.
- D. Students will learn about TOC and the Thinking Tools by developing and critiquing UDE's.

IV. Learning Activities
- A. Time Frame: 2 50-minute sessions
- B. Learning Resources (Readings, Handouts, Slides, Demo's)
  1. Reading: Nagarkatte & Oley (hereafter abbreviated NO)—NO:1.3-1.7; 2.1—2.2
  2. See my handout on Portfolios (FYEO).
  3. Math Self Efficacy Scale (# 2 pencils and erasers needed) for pre/post comparison.
  4. Informed Consent forms with confidential information and 4 page survey
  5. Mathematics Belief Inventory (for pre/post comparison).
  6. Some normed assessment of math skills (for pre/post comparison)-take students to the assigned computer lab.
  7. Format for portfolio entries and file folders for students (get from Janice)
  8. Large manila envelope to collect surveys in; someone other than instructor should distribute and collect them.
  9. Precut sections of rubber/plastic hose of two different diameters; duct tape and scissors, or a good imagination.
  10. Put the names of well known tunes on slips of paper. There should be 2 or 3 of each song.
- C. Teaching Methodologies
  1. Group activities

[1] Consultation Developing Lesson Plans – Drs. Nancy Lester, Rupam Saran, Education Department, MEC

2. Individual work
3. Lecture
4. Demonstration
5. Surveys

D. Topical Outline

1. Give overview of goals of the lesson (see Aim).
2. Distribute the syllabus, if any; textbook
3. Have students introduce each other or some other warm-up activity; ask, but do not require students to comment on their math experiences/goals.
    a. Example: Distribute songs to hum randomly to students, two of each song. Students hum the tune and look for the other person who is also humming it. This is the person they will introduce.
4. Discuss the purpose of the workshop. Students will learn how to
    a. Identify what needs to be changed, what to change it to, and how to change it.
    b. Resolve conflicts using a win-win strategy (give examples)
    c. Learn the difference between needs and wants.
    d. Reach their goals in the most effective and efficient way possible (give examples)
    e. Manage their time well (give examples)
    f. Make good decisions (give examples)
    g. Solve complex problems, including math problems (give examples)
    h. Think logically and predict consequences (give examples)
    i. Think creatively (give examples)

5. Explain that this is a special workshop and we want to evaluate its success. In order to do this, we are asking for their permission to collect some personal information about them and their attitudes towards mathematics. This information will not be made available to the instructor of the course without their permission. [Note: this might be postponed, depending on time constraints. It could come at the start of the next session.]
    a. Hand out the Informed Consent Forms with the demographic questionnaire. Students may decline to give permission. In any case, have a student collect the forms and place them in a manila envelope. A staff member will retrieve the envelope.
    b. Hand out the MSES and Beliefs Questionnaire. Remind students that they don't have to complete either. The forms should be collected and put into a manila envelope. Hand out the Informed Consent Forms. Students may decline to give permission. In either case, have a student collect the forms and place them in a manila envelope. A staff member will retrieve the envelope.
    c. Take students to the computer room for skills testing. Whether you do this before or after the surveys will depend on what date the room is reserved for. Taking a math test could influence how students respond to the surveys.

6. Introduce TOC and TP's (Thinking Process Tools) as the vehicle by which students will fulfill the purposes of the course.

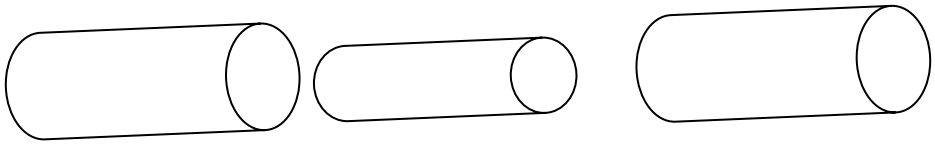
a. What is a TP? A graphical method to help us think better.

1) Give them the names and short definition of each: Cloud, Branch, Prerequisite (Ambitious) Target Tree.

b. What is TOC? A method for helping people think systematically using TP's to overcome obstacles or constraints (and create no new ones.)

1) Define constraint

a) Demo: Have students connect and blow through hoses of different diameters.



7. Introduce the notion of UDE's (UnDesirable Effects). How to state what is bothering you so that you can fix it.

a. UDE= statement describing an effect that you don't want that leads to an issue/problem that you have (give examples, p 15). An UDE must (this could be listed on the board or on a handout)

1) be serious
2) be a condition, not a lack of an activity
3) not blame anyone
4) have no emotion
5) happen frequently
6) have a serious negative outcome
7) not be a negative effect or symptom in itself
8) not include the solution within the statement
9) be a simple sentence
10) be a current fact
11) Put in boxes with rounded corners.

b. Guided Practice 1: Students will write about their experiences in math or in their chosen major. Then they will list the conflicts/issues (UDE's) that they are currently facing, especially as they relate to being a successful math student, or a list of obstacles that stand in the way of their graduating in their major. They will exchange their list with another student for feedback on how they are phrased. Well phrased UDE's are read to the class (or better, displayed on a screen using a Smart Cart with WORD, PPT or, best, EXCEL. These can then be used later on in developing Clouds and PRT's). This work will be the first entry into the student's portfolio. The student should comment on the entry (see Janice for suggestions as to what questions you should pose for them to comment on).

c. Independent Practice (as homework, or in class, depending on time constraints): Students will write down the storyline for a difficult decision they have made and be prepared to read it to the class. This could be another entry in their portfolio.

8. Summary of current lesson

9. Preview of next lesson: Seeing Consequences and Making Decisions

V. Assessment/Evaluation of Learning

A. Collect list of UDE's and evaluate them for correct format.

B. The MSES is known to correlate with performance in math. We will compare students' ratings before and after the workshop with their actual math performance.

C. The Beliefs Questionnaire is not a standardized or normed instrument. However, it may be useful to compare the students' and faculty's perspective on these items, as a way to improve self-efficacy. You should fill it out. Perhaps we can get other Math faculty to do so as well.

D. Note how many and which students continue/drop the workshop and/or course. Keep records.

LESSON PLAN 2 —TOPIC: Seeing Consequences and Analyzing Decisions—Sufficiency Logic and Branches

E. Aim or Goal of the Lesson: Students will improve their decision making skills using logical thinking.

VI. Essential Questions
- A. What is sufficiency logic?
- B. What is a positive/negative logic branch?
- C. How can you turn a negative branch into a positive one?
- D. How can you use sufficiency logic to explain/improve your decisions?

VII. Teaching/Performance Objectives to achieve the Goal
- A. Students will create and critique sufficiency logic branches.
- B. Students will use "injections" to turn negative branches into positive ones.
- C. Students will use sufficiency logic to map out a difficult decision they have made.

VIII. Learning Activities
- A. Time Frame: 2 or 3 sessions
- B. Learning Resources (Readings, Handouts, Slides, Demo's):
  Reading: NO—1.7; 3.2; 3.3
  Bring Post It's, one pack per student. Retrieve the leftovers at the end of class for the next class.
  See the handout on Categories of Legitimate Reservation (FYEO).
- C. Teaching Methodologies
  Lecture
  Guided practice
  Independent practice
- D. Topical Outline
  1. Review of previous lesson—remind them about the UDE's they created and the storylines they developed about decisions they have made. If there was no time for the surveys in the previous class, start with that.
  Provide an overview of current lesson
  Explain that TOC is a logic-based system. We will discuss one type of logic in this lesson, Sufficiency-based logic. Necessity –based logic will be addressed in a later lesson.
  Sufficiency-based Logic. Define Sufficiency-based logic with examples and proper representation. Students should practice saying "If.. then" when they read the notation. [Necessity based logic will come later].
    a. "If it rains, then the road is wet." Rain → road wet. By itself, rain is enough to make the road wet.
    b. "Smoking causes cancer." (If you smoke, then you will get cancer.) Smoking → Cancer. By itself, smoking is enough to produce cancer.

Assumptions. An assumption is something that we believe to be true or valid without question. In a "cause and effect statement" –an "if A ..then B" statement in sufficiency logic—A is the cause and B is the effect. The cause may be a condition, state or action. When we say "If A, then B," we are assuming that A is true or exists or really happens.

c. Ex. "If the world is flat, then ships will fall off when they reach they edge." "The world is flat" is an assumption about the state of the world that may or may not be true.

Injection. An injection is a challenge to an assumption. It is always possible to challenge assumptions. An injection can come in the form of a condition—a logical argument-- or an action, and will invalidate the assumption. For example, we can question the assumption, "The world is flat," by sailing around the world (action) or looking at satellite pictures of the earth (action). We will see that the earth is not flat. These are two injections, either of which invalidates our assumption: The earth cannot both be flat and not flat at the same time. If our assumption is wrong, then our conclusion must also be wrong. We will use injections to resolve conflicts and eliminate negative consequences of decisions later on in the workshop.

d. Guided practice: Take the statement, "If it rains, then the road is wet." Have the students come up with an injection to invalidate the assumption (road is wet) here (e.g, road is dry).

Categories of Legitimate Reservation. We must always check the logic of an "if..then" statement to make sure that it is correct. A challenge to the validity of a conclusion or the logic in an 'if…then…' statement, is called a " legitimate reservation." There are many types of reservations, but they fall into only a few categories, hence "Categories of Legitimate Reservation>". Here are some reservations or questions you can use. Questioning must always be done in a respectful manner. [You may wish to introduce the technical names of the categories—see the handout:
Clarity, entity existence, causality existence, cause insufficiency, additional cause, cause-effect reversal, predicted effect existence and tautology.]

e. Is the logic reversed? If the road is wet, must it have rained? Or if you have cancer, must you have smoked? No! A→B does not mean B→ A!

1) Guided practice: Prepare examples where the causal link is reversed, and have the students critique them, e.g., If I am late to class, the subway was delayed. Emphasize the need to comment on the logic, not the person, in a con-confrontational way.

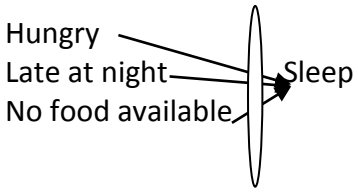
f. Is the logic correct on the face of it?

1) Guided practice: Prepare other examples where the causal link is not clear, e.g., If I am hungry, I go to sleep. Ask students to critique the logic.

g. Does the logic need additional causes or steps to make sense? Is the cause insufficient to create the effect?

1) Guided practice: Prepare examples where the causal connection is remote, but defensible, e.g., If I am hungry, then I go to sleep. Ask students to critique the logic from this point of view. Offer additional steps, and introduce the idea of a BANANA to represent "AND," e.g., If I am hungry AND it is late at night AND I have no way to get food, then I go to sleep. [Missing causes are added.]

Example 1



Example 2

Hungry → I search for food all night → I am up all night → I fall asleep in the morning. [Missing steps are added]

h. Are the cause and the effect the same thing? If they are two ways of saying the same thing, this is called a "tautology."

1) Example: If I have six dogs, then I have half a dozen dogs.

The Branch: a TOC tool used to logically analyze and explain a logical structure of cause-effect connections

i. Negative branch shows how an idea can logically lead to an outcome we don't want (UDE). Relate UDE to prior discussion.

- Guided practice 1: Have pairs of students construct a 5 step linear negative branch, starting with the UDE "I do not have a copy of the math textbook (basic idea)." Emphasize that each step must be read as an "if..then" pair. [See page 10.] They should put the statements on the non-sticky side on the post it and use the wall if possible to arrange them. Have other students critique the branch. If the logic is not totally clear, have then add supplementary causes (see banana above).Have students read aloud their finished branches.

1) Independent practice 1 (homework or classwork, depending on time): Ask students to take one or more of their previously listed UDE's and create a negative branch from it.

j. Positive branch: an idea leads to an outcome we want (DE-desired effect= a statement which is the logical opposite of an UDE).

1) Guided Practice 2: Have students construct a 5 step positive branch starting with the DE "I do my homework every day." Emphasize that each step must be read as an "if..then" pair. [See page 10.] They

should put the statements on the non-sticky side of a different colored post it and use the wall if possible to arrange them. Have other students critique the branch. If the logic is not totally clear, have then add supplementary causes (see banana above).Have students read aloud their finished branches. The final version should be written down and handed in.

2) Independent Practice 2, as homework or in class, depending on time: Have students take their personal UDE's and turn them into the logical opposite (DE), phrased in general terms. Have them pick one and use this to create a positive branch.

k. Application of an Injection: intervention that breaks one of the arrows in the negative branch, and thus prevents the negative outcome.

1) Guided Practice 3: Ask for a volunteer to present a negative branch. Put this on the board or screen. Ask the class to propose one or more injections that would break one or more of the arrows in the branch. Point out that by providing injections, the negative outcome can be avoided.

2) Independent Practice 3, as homework or in class, depending on time: Have the students create positive branches leading from the injections to complete the logical picture.

Analyze/justify a difficult decision using logic branches. This shows how sufficiency logic can be used to explain/analyze and justify (or not) a difficult decision. It should help students to improve their decision making.

l. Guided practice 4: Students should have copies of their storylines from the previous class. Ask for a volunteer. Have him/her read the storyline. Ask the class to identify the entities and to link them logically. Critique the logic. Bananas and supplementary causes are allowed. (See page 72 example)

m. Independent Practice 4 (homework or class): Have students do the same analysis of their own decision storyline. They should comment on whether their decision was justified, in view of the analysis.

Summary of current lesson

Preview of next lesson: Current Reality Tree (CRT)—application of branches.

IX. Assessment/Evaluation of Learning

A. Evaluate negative and positive branches.

B. Evaluate analysis of difficult decisions.

LESSON PLAN 2A – Categories of Legitimate Reservations

Categories of Legitimate Reservation

LEVEL I

Clarity
The entities are not clear or understood by the listener.
1. Is any additional verbal explanation required for the cause or effect as written?
2. Is the connection between cause and effect convincing at "face value"?
3. Is this a "long arrow"? Are intermediate steps missing?

I'm not sure I understand something. Could you CLARIFY what you mean by >>?

LEVEL II

Entity Existence
So the entity actually exist in reality?
1. Is it a complete, grammatical sentence?
2. Is it a complex or compound idea?
3. Does the idea conveyed actually exist in reality? Is it valid?

Maybe I still don't understand. How do we know that >>EXISTS? What evidence is there to support it?

Causality existence
Tests the connection between two statements. Note: In most instances 4 or more causes leading to an effect is an immediate CAUSALITY RESERVATION.
1. Does the cause REALLY produce the effect?
2. Is the effect the DIRECT and UNAVOIDABLE result of the cause?
3. Is the cause intangible?

I'm not sure I see how [CAUSE] leads to [EFFECT]. Maybe you could explain it to me.

LEVEL III

Cause Insufficiency
Most common deficiency found in logic trees. Looking for additional causes for the effect. Only look for the largest contributing causes. OXYGEN concept
1. Is the proposed cause enough BY ITSELF to produce the effect?
2. If one of the causes is removed, will those that remain be enough to produce the effect?

It seems to me there's something missing. Besides [specify AUSE], you'd also need [provide contributing CAUSE] to get [EFFECT].

Additional Cause
Looking for additional INDEPENDENT causes for the EFFECT
1. Is this the only major cause?
2. Are their other INDEPENDENT causes that might result in the same EFFECT?
3. If the cause in question is eliminated, are there other circumstances under which the effect might still be present?

What you have there looks good. But could there be something completely separate that could give that same effect? I'm thinking of [specify ADDITIONAL CAUSE].

Cause-Effect Reversal
Determine whether the EFFECT is the source of the CAUSE.
1. Is the arrow REALLY drawn in the right direction?
2. Is the real cause properly identified?
3. Is the effect a visible indicator of the real cause?

I think you definitely have a connection there, but could [specify CAUSE] really be the effect? And [specify EFFECT] really be the cause?

Predicted Effect Existence
Strongest reservation. Can be used to confirm or refute connection.
1. Is the cause tangible (or measurable)/
2. Can one or more ADDITIONAL VISIBLE effect be expected form the cause?

Confirmation
Predicted effect *should* bee there and *is* there.
Predicted effect *shouldn't* be there and *isn't* there.
Refute
Predicted effect *should* be there but it *isn't*.
Predicted effect *shouldn't* be there but it *is*.

The cause you're proposing is a little hard to verify. It seems to me that if what you say is true, we should also see [specify Predicted EFFECT]. *But as far as I know, it's not there. This is a refuting statement.*

Tautology
Circular Logic.
1. IS the effect offered as the rationale for the existence of the cause?
2. Is an additional verifiable effect offered?

Wait a minute. Are you saying that [EFFECT] is the justification that [CAUSE] exists? That sounds like circular logic. Maybe you can explain it to me?

LESSON PLAN 3 —TOPIC: Current Reality Trees—What I need to Change

I. Aim or Goal of the Lesson: Students will use positive and negative branches to describe their current situations.

II. Essential Questions

A. How are the student's UDE's all connected?

B. How can negative branches and feedback loops be trimmed and positive branches and feedback loops sustained through injections?

III. Teaching/Performance Objectives to achieve the Goal

A. Students will use sufficiency logic to create negative branches from UDE's arising from one side of their conflict (Current Reality Tree)

B. Students will trim a negative branch to break a negative feedback loop

IV. Learning Activities

A. Time Frame 1 50-minute session

B. Learning Resources (Readings, Handouts, Slides, Demo's)

1. Reading: NO—2.2-2.3
2. Smart Cart with EXCEL
3. Have students bring their UDE's and from previous sessions.

C. Teaching Methodologies

1. Lecture/ demonstration
2. Class participation
3. Guided practice
4. Individual practice

D. Topical Outline

1. Review of previous lesson: UDE, sufficiency logic, positive/negative branches, injections.
2. Overview of current lesson
3. The Current Reality Tree. What are the issues in our lives that need fixing? The CRT is a graphical method of organizing these issues so that we can see patterns and relationships among them. [We will handle this as a standalone tool rather than as part of the CORE conflict resolution process].
4. Start with the UDE's. For example, suppose Monique is having trouble attending her math classes on time [example from textbook]. In discussions with her advisor, she mentions a number of other issues that she is having with math (the class may be able to come up with these themselves). They could be put in one column of an EXCEL workbook in preparation for the rest of the lesson:
    a. I can't follow the lecture.
    b. I believe that I am not capable of doing math.
    c. I don't work hard in math.
    d. I don't do the homework or prepare for class.
    e. I do poorly on tests.
    f. I feel that the exam is too hard.
    g. I have difficulty learning the math material.
    h. I have difficulty taking tests.

i. I don't attend my math classes regularly.

5. We use sufficiency logic, "If…then, " to connect all the UDE's . (It's amazing how they all fall into place!) This is a negative branch. It is also a graphical description the current reality of Monique's bad situation in math. It gives us some idea of what needs to be changed in her situation.

a. Guided Practice 1: Put 2-3 students in a group and have each group Monique's UDE's with their numbers on the non-sticky side of Post Its. Have them create negative branches using ALL the UDE's. Ask for volunteers to read their branches. Once they have done this, and assuming that no one has developed a loop, show your arrangement as another alternative.

4→7→9→5→6→2→3→1→4

Ask the class if they see any interesting pattern here. In the particular case, there is a negative feedback loop: the less homework/preparation she does, the less she can follow the lecture and the less homework she does. If nothing is done to break the loop, it will continue cycling downward, with disastrous results for Monique. Note that not all CRT's/branches end in a loop! Ask the class to propose injections at several points to break the loop (trim the negative branch), e.g., the prof could give her practice tests (between 5 an 6).They should identify any loops that may exist, and provide injections to trim the negative branches. Collect this work.

b. Independent Practice 1: Have the students list at least 10 UDE's in their lives and create a CRT from them using sufficiency logic.

6. Summary of current lesson
7. Preview of next lesson: Resolving Conflicts using Clouds

V. Assessment/Evaluation of Learning

A. Comment on the personal CRT's.

LESSON PLAN 4 —TOPIC: Resolving Conflicts using Clouds

II. Aim or Goal of the Lesson: Students will use the Evaporating Cloud technique to resolve internal and external conflicts.

III. Essential Questions

A. What is an Evaporating Cloud and when is it helpful?
B. What is the difference between a Want and a Need?
C. How is a conflict resolved so that everyone wins?

IV. Teaching/Performance Objectives to achieve the Goal

A. Students will identify UDE's and turn them into logically conflicting wants/actions.
B. Students will identify needs associated with the wants, and the common objective of the conflicted parties, and will use them to create a Cloud.
C. Students will uncover the assumptions underlying the necessity based logic in the Cloud conflict, and will invalidate them with injections to resolve the conflict.

V. Learning Activities

A. Time Frame: 2 or 3 50-minute sessions
B. Learning Resources (Readings, Handouts, Slides, Demo's)

1. Reading NO: 2.4-2.10
2. Have a conflict template available on Powerpoint that can be filled in as you move through the lesson. This could be done on the board instead.
3. Prepare enough storylines of conflicts between two people for the class (one storyline per two to four students). Try to make them realistic and relevant to student concerns. You could use the UDE's they prepared in the first session for ideas.

C. Teaching Methodologies

1. Lecture/ demonstration
2. Guided group practice
3. Individual practice
4. Oral presentations by students

D. Topical Outline

1. Review of previous lesson: How to formulate an UDE correctly; assumption; injection.
2. Overview of current lesson
3. Necessity-based logic is the foundation of the TOC conflict resolution technique.

a. In sufficiency logic, we say, "If it rains, then the road is wet."

Rain → Road wet.

We mean that the rain caused the wet road; rain is sufficient to make the road wet.

b. In necessity-based logic, we say, "If the road is wet, then it must have rained."

Wet road ← Rain.

This means that the only way that the road could be wet is if it had rained; rain is necessary for the road to be wet.

4. Evaporating Cloud (hereafter called "Cloud"): a graphical TOC thinking process tool based on necessity logic that allows us to analyze a conflict in detail and to take meaningful action or make a decision to resolve it in an efficient and non-confrontational way. It can be used to resolve internal conflicts (e.g., should I go to class or take care of my child?) or external ones (e.g., my boss wants me to work on Sunday and I don't want to). It can be used to resolve both acute conflicts (e.g., my son wants to play with his friends but I think he should go to sleep) and chronic ones (e.g., my spouse is messy and I am neat).

a. Structure of the Conflict: 5 boxes—state and label them on the board without much explanation at this point. Point out the direction of the arrows and mention necessity based logic.

5. The storyline—what is the problem? Students have already prepared storylines for the lesson on analyzing decisions.

a. Guided Practice 1: Have each student write a storyline describing a conflict s/he is experiencing. Ask for volunteers to read theirs to the class. If the storyline is unclear, ask for more details to add clarity. Select several storylines for the demonstration. Ask the class to state correctly the UDE's in the storyline (see page 10,34 for how to formulate UDE's). For example, if the story is "I don't have the money to buy my textbook" the UDE might be "I don't have my textbook." Explain how it meets the criteria for a good UDE.

6. Turning the UDE into a conflict: A conflict must be stated in terms of logically opposite specific WANTS or ACTIONS caused by or related to the UDE, e.g. "Get the textbook; don't get the textbook." The conflict can't be "Eat chocolate ice cream versus eat vanilla ice cream"—rather, "Eat chocolate versus don't eat chocolate ice cream." Give other examples.

a. Guided Practice 2: Have students create properly stated conflicts for their storylines and read them to the class. Provide feedback as needed. Pick one conflict to analyze further. It is probably easier to deal with a two person conflict for starters. Put the conflict into the correct boxes on the diagram (D-D' "d prime" with the double ended arrow).

5. Establish the COMMON GOAL or objective of the two sides for the chosen conflict. This should be a state or condition that both sides agree is something they desire as a goal. It should be stated in general terms and is usually pretty broad, e.g., Be a successful person; have a happy family.

    a. Guided Practice 3: Have the students identify the Common Goal. Provide feedback as needed. Fill in the A box of the Cloud.

6. Identify the NEEDS of each side. We are often pretty sure of what we want, but it is harder to see what our real needs are. For example, we may very much want to eat chocolate cake, but our real need is to satisfy our hunger. In a Cloud, the NEEDS of the two sides are never opposed to each other. Like the goal, the needs are expressed as general states or conditions. The need B should never oppose D'; C should never oppose D. The goal is achieved when the needs of both sides are satisfied (p16). The needs of both sides are related to the wants and to the goal by necessity logic, i.e.,

    a. In order to have or satisfy my need (B/C), I must first have my want (D/D'): B ←D and C←D'
    b. In order to reach my goal (A), I must first satisfy my need (B/D):

        A←B and A←C

    c. Guided Practice 4: Identifying needs is the hardest part of the cloud. Ask the students for possible needs for each side. Read the cloud from left to right out loud to see if the needs make sense, i.e., in order to have A, I must first have B/C? In order to have B/C, I must first have D/D'? Check to make sure that B does not make D' impossible and B does not make D impossible. Pick the needs that make the most sense.

7. Identifying the assumptions underlying the arrows. Recall that an assumption is "A statement or condition accepted as valid without substantiation or proof—Demeter, p397." To bring to the surface or "surface" our assumptions we say, "In order to have B/C I must have D/D' BECAUSE…", "In order to have A I must have B/C BECAUSE…", "D and D' cannot occur at the same time BECAUSE…" In other words, what are our reasons for saying that the one is necessary for the other?

    a. Guided Practice 5: Have the students identify possible assumptions for B-D, C-D'. If things go well, do the same for A-B, A-C, and D-D'. Have the students read the cloud from left to right and provide feedback on the assumptions.

8. Adding injections to resolve the conflict. As you examine the assumptions, you will see that some of them are not true, that is, they are invalid. Others may be true, but you could easily take some action to make them invalid. Such actions are injections, and if applied, will break the "necessary" connection between needs and wants (or goals

and needs, or between wants). You only have to break one link to resolve the conflict. Some ways to break a conflict with a win/ win solution:

a. Show that D' fulfills both needs B & C. Thus, D is not needed (i.e., negate D). D' does not jeopardize B. Give an example.
b. Show that D fulfills both needs B & C. Thus, D' is not needed. D does not jeopardize C. Give example.
c. Show that D and D' can both occur, but at different times and for different purposes. This could reflect a change in Policy. Give example.
d. Show that neither D nor D' are needed, because another action, E, fulfills both needs B & C. Give example.
e. Guided practice 6: Ask the students to identify any assumptions that are simply untrue (and say why). Cross these out. Ask the students to come up with injections that will invalidate other assumptions. Cross these out. The students will probably see quickly how to resolve the conflict in at least one way.
f. Independent Practice 1. Ask the students to bring in a cloud a day for the rest of the workshop based on real conflicts that they are dealing with. Their portfolio should reflect their growing skill. Encourage them especially to bring in issues related to their math course. If they are skilled enough, have them write a storyline, create a Cloud, identify the assumptions and propose a solution using Powerpoint. They should be dated, and will become part of their portfolio. Unless otherwise agreed to, they should remain confidential.
g. Independent Practice 2: You should have already prepared conflict storylines involving two people. Randomly assign D and D' to pairs of students. Ask them to pretend that they are committed to D or D' and to resolve the conflict together using a cloud. They should put their cloud and solution on the board and describe it to the class. Provide positive feedback.

9. Dealing with Chronic Conflicts (NO: 2.5). A Chronic Conflict is one in which the person feels trapped, doesn't see any other choice but to do what s/he is doing, and feels powerless to resolve the conflict. It is a long term, highly emotional situation and little effort is going into resolving the situation. You should give a detailed example in class (see Chap 2), but don't expect the students to do it themselves at this point. Key elements in dealing with a chronic conflict:

a. You must break the cloud on the B-D side (your side).
b. The C-D' side must be accepted without neglecting the needs in B. D' is the changed behavior after the discussion.
c. You should prepare a Negative Branch arising from D using sufficiency logic.
d. The negative branch must be "trimmed" by an injection in order to improve the solution. The other side can help here (see Communicating…) (This was discussed previously when sufficiency logic was presented.)

e. You should also create a Positive Branch arising from the injection. This will strengthen the decision to do D'. The other side can help here too.

10. Communicating the chronic conflict to someone else. It is one thing when you are trying to resolve your own routine personal or interpersonal conflict; resolving a chronic conflict with someone else requires a slightly different approach. Before you meet with the person, you go through the steps outlined above. When you do meet, do the following:

a. Recognize the other person's want, and state that at this moment your want/action is the opposite, but that you want to make a fresh start.
b. Describe A-C-D' as you see it, and ask if that correctly describes the other side's position. Revise as needed.
c. Try to find out what UDE's your want (D) has caused for the other person.
d. Present the A-B-D side and the assumptions behind B-D.
e. Present the negative branch arising from D that you have prepared ahead of time.
f. Ask the other party to help you come up with an injection to trim the negative branch. Try to trim the branch at several different places; earlier is better.
g. Never go back to your want (D).
h. If the other side cannot come up with injections, go back to the common goal, and make sure the other side knows you are sensitive to his/her need.
i. Independent Practice 3: Encourage students to deal with their own chronic conflicts using the cloud approach. Ask them to bring examples to share with the class, and/or to put into their portfolio for your private comments.

11. Summary of current lesson
12. Preview of next lesson: optionally, CORE CONFLICT, if things are moving quickly and there seems to be interest; otherwise, TIME MANAGEMENT

VI. Assessment/Evaluation of Learning

A. Compare earlier storylines with the current one to see progress.
B. Evaluate guided practice.
C. Evaluate conflict resolution presentation to the class.

LESSON PLAN 5 —TOPIC: Time Management

I. Aim or Goal of the Lesson: Students will see that multitasking is not an effective way to manage their projects. This is a short lesson that changes the pace by using a game.

II. Essential Questions

A. What is a project versus a task?
B. What is multitasking?
C. What are the consequences of multitasking?

III. Teaching/Performance Objectives to achieve the Goal:

A. Students will see their work in terms of projects and tasks.
B. Students will play a game in which they compare multitasking approaches with a serial project approach.

IV. Learning Activities

A. Time Frame: 1 50-minute session
B. Learning Resources (Readings, Handouts, Slides, Demo's)

1. Reading—NO: 4.3
2. Each student must bring to class a timing device that can count seconds (or, failing that, the "timer" can be a person who counts off.)
3. Hand out copies of the data sheet for the game to each student.
4. Post Its for the class

C. Teaching Methodologies

1. Lecture
2. Game playing
3. Independent Practice

D. Review of previous lesson
E. Overview of current lesson
F. Topical Outline

1. <u>The problem</u>. What is your goal in life? Most people would say being happy and productive. We don't want to waste our time doing meaningless things; we want to accomplish something. Unfortunately, many of us work on the things that are most urgent, but not necessarily the most important. So we don't make good progress toward achieving our major goals. What is the most effective and efficient way to reach our goals?
2. Let's start with some <u>definitions.</u> Project: a sequence of logically arranged tasks to achieve some goal. A task is a unit of activity. Tasks

must be arranged in a particular order, sequentially, in order to complete the work by the end of the project. For example, you can't complete a math problem or the course syllabus by starting in the middle and jumping around; you can't build a house by starting with the electrical system etc.

3. Time Management Game: You will work on 3 "class projects." In this game, each project has 20 tasks and each project is for a different professor. Each professor says that his/her project is due tomorrow! Does this sound familiar? How would you approach this problem? Would you start all of them and switch from one to the other to try to make the deadline? When you are working on many things at once, this is called multitasking. Or would you try to complete one before beginning the next?

4. Assumptions (or starting conditions):

a. Hand out the data sheet to each student. Pair each student with a time keeper. After doing this game under both conditions once, reverse their roles.
b. To make this game simpler, let's say that each task takes ½ sec on average. If we allow 1 sec, that should give us more than enough time.
c. You have promised each professor that you will have his/her project done in 20 secs (if only reality were this simple!)
d. All three projects have been promised in 60 secs.
e. Column 1 for each project shows a model of how to compete the project, and how long it takes, on average, to do it.

5. Rules for playing the game.

a. Round 1: Note the time. Quickly start Project 1. Write 1 through 20 down the second column. Note the time when you completed this project and compute the total amount of time it took you. Enter this at the bottom of column 2. Start your watch and start Project 2: Write A through T down the second column. Note the time when you completed this project and compute the total amount of time it took you. Enter this at the bottom of the column. Start your watch and start Project 3: Draw a triangle, circle and diamond in sequence down the second column. Note the time when you completed this project and compute the total amount of time it took you. Enter this at the bottom of the column.
b. Round 2: Now that you are familiar with the tasks, things should faster (not!). Your job this time is to do Task 1 of each project before beginning Task 2. That is, do Project 1, Task 1- write "1," then Project 2, Task 1- write A, then Project 3 Task 1—draw a triangle. Do this for all the Tasks and Projects. Start

your watch and begin Project 1, Task 1. Write down the time when you finish Project 1, Project 2 and Project 3 in column 3.

6. <u>Conclusion</u>: Now compare the time it took you to do all the projects in Round 1 versus Round 2. You should see that it is much faster to complete a project before beginning another than to switch among them (multitasking). But what if we have many tasks to complete in a day (reality)? How do we get them done without being bored? Break the project into groups of tasks that mark your progress toward the goal (a "milestone"); reward yourself with a break when you complete each group. The key is to concentrate on the project you are doing at the time instead of multitasking (e.g., don't watch T.V. and try to study at the same time!)

7. <u>Independent Practice 1</u>: A project plan. Each student should think of an important project that she needs to complete in a hurry. S/he should put each task that makes up that project on the non-sticky side of a Post It. The tasks should be arranged in meaningful groups whose completion represents a "milestone" in getting the project done. The groups should be put into "logical" order, and the tasks within them also. The meaning of "logical" is not specified at this point, but will be fleshed out in subsequent lessons. Have students keep the Post Its and turn in a written version of the basic project plan for later use.

G. Summary of current lesson

H. Preview of next lesson: Making Plans (PRT).

V. Assessment/Evaluation of Learning

LESSON PLAN 5A – Multitasking Game

The sooner we start a project the sooner we finish.

Project 1	Project 1	Project 1	Project 2	Project 2	Project 2	Project 3	Project 3	Project 3
1			A			Δ		
2			B			O		
3			C			◊		
4			D			Δ		
5			E			O		
6			F			◊		
7			G			Δ		
8			H			O		
9			I			◊		
10			J			Δ		
11			K			O		
12			L			◊		
13			M			Δ		
14			N			O		
15			O			◊		
16			P			Δ		
17			Q			O		
18			R			◊		
19			S			Δ		
20			T			O		
58 sec			59 sec			1 minute		

Expected Project Finish Time when each project is done one after another is 58 seconds, 59 seconds and 1 minute respectively.
The next bottom box is Actual Finish Time you need when each project is done one after another. The final bottom box for each project is Actual Finish Time with multi-tasking.

The point of the game is to convince the player that constant shifting from one task to another takes away speed and concentration. If we move from the first project of numbers to writing letters, we must think which letter to write, and after that if we move to the third project, we must decide which figure needs to be drawn – a triangle, circle or a diamond. These decisions

LESSON PLAN 6 —TOPIC: Making Plans—The Prerequisite Tree and Necessity-based Logic

VII. Aim or Goal of the Lesson: Students will use necessity-based logic to develop plans to reach their goals and solve problems.

VIII. Essential Questions:

A. What is necessity-based logic?
B. How do you identify obstacles and intermediate objectives?
C. How do you construct a Prerequisite Tree?
D. How can the PRT be used to plan and to solve (math) problems?

IX. Teaching/Performance Objectives to achieve the Goal

A. Students will create necessity-based logic branches, using the Categories of Legitimate Reservation.
B. Students will identify a goal and the obstacles to obtaining it (UDE's).
C. Students will turn obstacles into intermediate objectives (DE's).
D. Students will arrange the intermediate objectives in necessity-based order to create a Prerequisite Tree.
E. Students will use the PRT to plan and to solve problems.

X. Learning Activities

A. Time Frame: 2 50-minute sessions
B. Learning Resources (Readings, Handouts, Slides, Demo's)

1. Reading: NO:4.1-4.5—a good summary of the activities to be carried out.
2. Post Its, one pack per student. Retrieve leftovers for the next class.
3. Prepare one or more math problems that lend themselves to analysis using the PRT. See 4.2.1 &4.2.2 long division example.

C. Teaching Methodologies:

1. Lecture
2. Guided Practice
3. Individual Practice

D. Topical Outline

1. <u>Review</u> of previous lessons: UDE's, DE's, Categories of Legitimate Reservation; if there was homework or independent work, give feedback before continuing. This is recommended practice for all sessions. If students are very comfortable with necessity-based logic, you can skip that part here. Otherwise, include, since this type of logic is the hardest to use.

2. <u>Overview</u> of current lesson (see Essential Questions).

3. Necessity-based logic is the foundation for this material. Using sufficiency-based logic, we say "Smoking causes cancer." Smoking is, by itself, sufficient to cause cancer. We can think about causes in term of "necessity logic" as well. "If I have cancer, then I must have smoked." In this case, we are saying that smoking is necessary for getting cancer; I will not get cancer if I don't smoke. Smoking enables cancer, so to speak. This is represented as:

Cancer ← Smoke

a. Guided Practice 1: This takes the previous discussion of necessity based logic to a higher level. Pairs of students are asked to develop a 5-step necessity-based logic branch, starting with "In order to succeed in school, I must first….." They should put the entities on the non-sticky side of a Post it, and arrange them from left (succeed in school) to right on the wall. They should present them to another group for comment based on the Categories of Legitimate Reservation. Notice that the arrow goes from right to left, not right to left as in sufficiency-based logic. This is read " In order to get cancer, we must first smoke." Students should practice using the correct language. When finalized, students write down the logic branch with their names on it and turn it in.

4. Creating a Prerequisite Tree to reach a goal.

a. Establish the common goal by consensus. The is the overall DE.

(a) Guided Practice 2: Put students in groups of no more than 3. Ignore the groups for the moment. Ask the students what their goal is for the summer math course. Go around the room until there is a consensus on a general goal. Hopefully, it will be something like "Succeed in the math course." Have them put the agreed upon goal on the non-sticky side of a Post It. Discuss the importance of reaching agreement on what the goal is and what it means (no ambiguity).

b. Obstacles (OB's): something that stands in the way of achieving a goal=UDE. If succeeding in math is our goal, for example, what are the obstacles to reaching it?

(a) Guided Practice 3: Go around the room and ask each person for one obstacle to succeeding in math. Designate a recorder for each group. The recorder should write each obstacle identified by the class on the sticky side of a different Post It. Keep going around until there are no more obstacles. Each UDE must conform to the requirements for an UDE (see earlier lesson). The instructor should comment on the correctness of

the expression. It is helpful to display the OBS (UDE's) and and later IO's (DE's) in parallel columns in EXCEL as the class develops them. They should be numbered for convenience. The students should number them similarly on the Post Its. Students may have already identified some of these UDE's in the first class, and may make the connection. If not, you should.

c. Intermediate Objectives (IO's). These are the logical opposites of the UDE, i.e., a DE, phrased as a state or condition. They are not specific actions or solutions to the problem implied by the UDE. This is the hardest part of the PRT for most students.

(a) Guided Practice 4: For each UDE that a group has identified, they should write the corresponding DE on the non-sticky side of the PostIt. Students should ask their partners for comment. The instructor should go around the room to check on the correctness of the expression.

d. The Prerequisite Tree (PRT). This shows the logical pathway to achieving the goal.

(a) The tree should go from bottom to top, with the goal at the top.
(b) Arrows should point upward.
(c) Bananas are allowed.
(d) It may be necessary to rephrase an IO for it to make sense in the tree.
(e) OBS and IO's should have the same numbers.
(f) There can be more than one IO for a given OBS, i.e., 3a, 3b..

a) Guided Practice 4: Once the IO's have been vetted, the instructor should ask the groups to put the IO's into necessity-based logic form on the wall. The goal should be at the top, with arrows pointing upwards from the bottom.This should take some time and effort on their part. The instructor should go around to check on the groups and provide assistance as needed. When finalized, the students should copy the PRT and turn it in with their names on it.

(g) Show the class how laying the PRT on its side creates a time line for reaching the goal.

(h) Application of PRT to personal issues.

a) Independent Practice 1: Ask students to pick a goal of great personal importance and to turn in a PRT. They should include the list of 10+ OBS and IO's as well as the PRT.

(i) Application of PRT to solving a math problem.

(i) Guided Practice 5: The instructor should prepare a word problem (storyline) in math that is appropriate to the students and relevant to the math course. Have them agree on the goal (i.e.,to solve the problem), and then solicit OBS and IO's as before. Have each group develop a PRT to solve the problem. This will be a generic path to the solution, but it should help students to understand what specific information/skills they will need to solve it. Collect each group's OB's, IO's and PRT (written down once they have finalized it).

(ii) Independent Practice 2: Ask students to analyze a word or other math problem from their math class and turn in the OBS, IO's and PRT for solving it.

5. Review of current lesson
6. Preview of next lesson: Transition Tree—detailed specific steps to take to obtain each intermediate objective.

XI. Assessment/Evaluation of Learning

A. Evaluate logic branches.
B. Evaluate OBS, IO's and PRT's.

LESSON PLAN 7 —TOPIC: Reaching the Goal using Transition Trees

I. Aim or Goal of the Lesson: The student will use sufficiency logic to lay out the detailed actions to be taken to reach a goal along with the rationale for doing them.

II. Essential Questions:

A. What is the difference between a Prerequisite Tree and a Transition Tree?

B. How do you get from a general plan to the specific actions that will bring you to the goal?

III. Teaching/Performance Objectives to achieve the Goal

A. Students will select an Intermediate Objective from a prior PRT and will identify actions to be taken to reach the goal.

B. Students will arrange the tasks in logical order using sufficiency-based logic.

C. Students will develop a Transition Tree by adding in the Needs, Working Assumptions, and New Reality for each Action.

IV. Learning Activities

A. Time Frame 1 50-minute session. Note, this is a difficult concept to get across and may take more time.

B. Learning Resources (Readings, Handouts, Slides, Demo's):

Reading NO: 4.6 [This section is modeled after Holt, not the textbook; apparently there are different views on this. I may revise this after Umesh returns].
The students should bring with them the PRT's they developed in earlier lessons.
Prepare a TrT for doing a math calculation, e.g., divide 224 by 5000. Look at 4.6.2.2 example.
Bring Post Its for the class.
Bring a template for a TrT to use in class on Powerpoint.

C. Teaching Methodologies

Lecture
Guided practice
Independent Practice
Oral presentation

D. Review of previous lesson: Prerequisite Tree, necessity and sufficiency logic

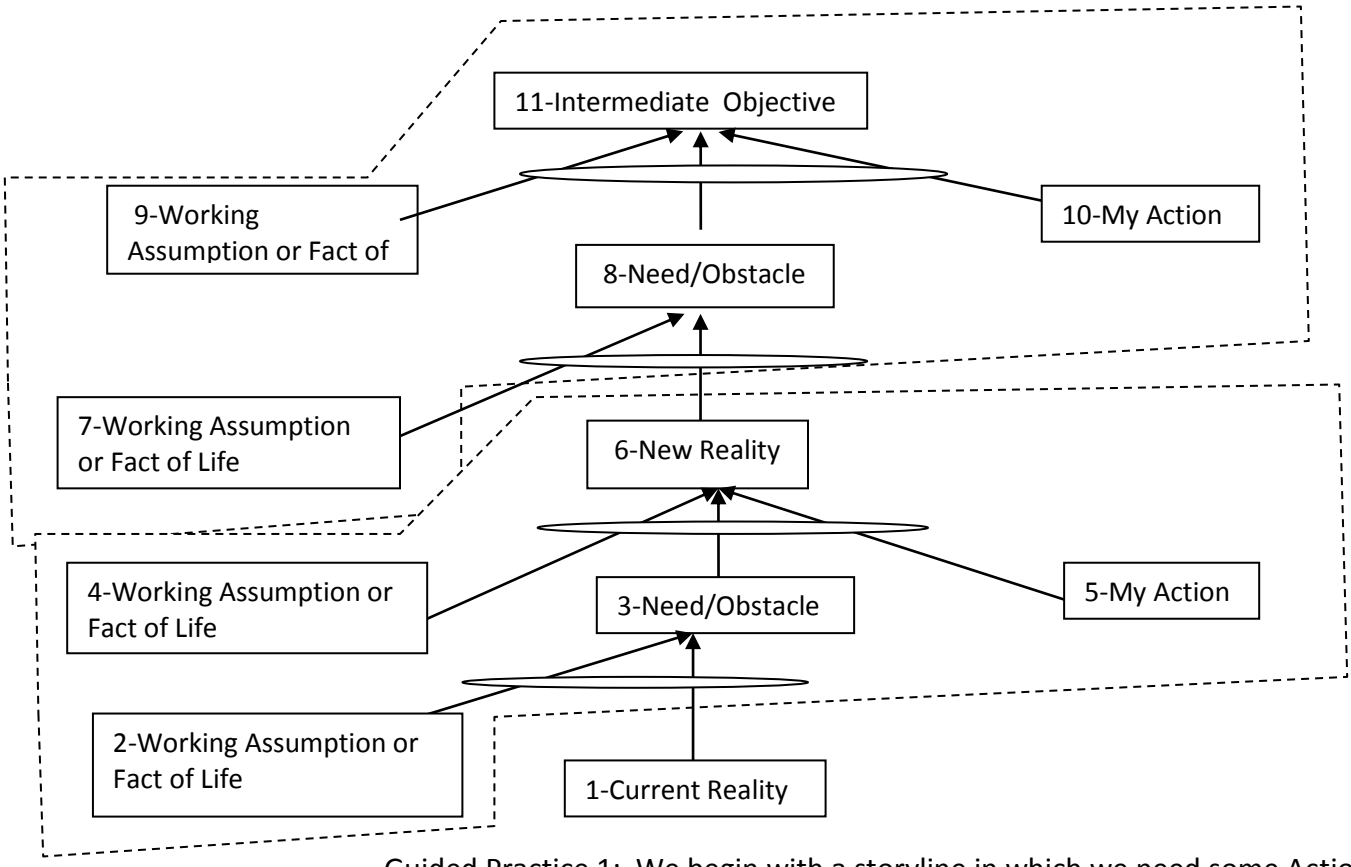
E. Overview of current lesson

F. Topical Outline

In a previous lesson, you learned about the Prerequisite Tree as a tool for planning how to reach your goals. Using a list of Obstacles to achieving a goal, you created Intermediate Objectives. These IO's were of a general nature, and represented states or conditions rather than specific actions. You then used necessity-based logic to connect the IO's to the goal, that is, you created a PRT. However, the PRT is not an action plan, telling you what to do at each step.
Specific actions need to obtain each Intermediate Objective are provided by the Transition Tree (TrT or TT). The TrT uses sufficiency-based logic, and is, therefore, another example of a branch. It gives us a clear set of instructions. It tells us how to do

things and why we should do them. A careful TrT analysis will keep us from leaving out a needed step as we move toward our goal.

Examine the TrT below. It has a repetitive pine tree-shaped structure (dashed lines mark the 5 key entities). There is an Objective (#11). It could be one Intermediate Objective from a Prerequisite Tree (or any goal for which a series of steps is required). There is a series of Actions (#5,10) that you must take to reach the Objective. In each repeating segment, there are three entities that lead to the New Reality (6) (or finally, the Objective) and are connected with a banana: the Need or Obstacle (#3,8) to be overcome by the Action; the Working Assumption or Fact of Life (#2,4,7,9), i.e., the reason which explains why taking the action will achieve the New Reality; and the Action to take (#5,10). The Current (or Existing) Reality (#1) refers to the conditions or reality that led to the Need. The New Reality (#6) is the expected effect of the Action + Need + Current reality. These will all be discussed in more detail as we work through an example.



Guided Practice 1: We begin with a storyline in which we need some Actions in order to reach an Objective or to overcome an Obstacle.

a. Ask the students for some examples of storylines that meet this criterion. Comment. Then provide your own: "I don't know how to cook but I want want to fry an egg. My girlfriend knows how to cook but can't help me at the moment, so she leaves me a list of instructions/ actions to take." The Objective is to fry an egg. The tasks listed in the instructions are the Actions to take.

b. Ask the students what some of the instructions might be. Write them on the board (or in EXCEL worksheet) in the order given to you (hopefully, they will not be in logical order). Have the students write the actions on the non-sticky side of Post Its.

c. Have the students organize the actions in logical order of execution (sufficiency logic—if… then) leading to the objective "Fry an egg."

d. For each action, have the students develop the Need/Obstacle, Current (prior) Reality and Working Assumption. Start with the Needs. You could assign a pair of students to work on each one. Each of these entities should be put on a

different Post It. Give an example before you let them work on it alone. For example, suppose that one Action is "Melt butter in the pan."

1) Ask the students: "What is the Need that this action satisfies, or the obstacle that this action overcomes?" It might be to keep the egg from sticking to the pan. Have them put this in the Need/Obstacle location on another Post It.

2) Then ask the students to verbalize the Working Assumption. "Why will taking this Action achieve the Objective? " It might be that melted butter, like any liquid fat, forms a slippery layer between the egg and the pan. Have them put this on another Post It.

3) Then ask the students "What existing conditions are needed in order for me to execute this action (Current Reality)?" It might be that you have an ungreased hot pan.

4) Finally ask the students "What new ability do you have after taking this action—melt butter in the pan-- that makes it possible for you to take the next action?"Another question: "What negative effects will be caused by the next action unless this action is taken?" Answering this will reveal the expected effect of the Action (the New Reality). An aside: If the Action leads to a negative effect (UDE), the negative effect should be "trimmed."

e. When fully constructed, this branch would be read "If I have an ungreased hot pan (Current Reality) AND an egg will stick to an ungreased hot pan (FOL=fact of life or Working Assumption), THEN I Need to keep the egg from sticking to the pan. If I Need to keep the egg from sticking to the pan AND melted butter, like any liquid fat, forms a slippery layer between the egg and the pan (Working Assumption) AND I melt butter in the pan (Action), THEN the egg will not stick to the pan (New Reality)." Diagram this for the students. Check all arrows for logical correctness.

f. The single Action in this example does not lead directly to the Objective to "fry an egg." It gets us closer, but this is just a short branch. This action must be followed (and preceded) by other actions in order for the egg to be fried. For each Action proposed, the Current Reality, Need and Working Assumption and New Reality must be developed. Once this is done, you will have a very good understanding of what to do, when to do it, and why you should do it.

Independent Practice 1: Have pairs of students work on each task required to fry an egg, using their Post Its. They should explain their work to the class. They should write down what they did and turn it in.

Guided Practice 2: Have the students develop a TrT for calculating 224/500. They should start by using a storyline to explain how to do it. Then, identify the tasks (actions) and the needs. Finally, add in the FOL and effects of their actions. This can be used as a model for how to explain and do many things in math.

Independent Practice 2: Ask the students to bring in a difficult calculation they were assigned and have them develop the TrT for doing it.

G. Summary of current lesson

H. Preview of next lesson: If time permits, cover the CORE CONFLICT

V. Assessment/Evaluation of Learning

A. Evaluate the "steps" to frying an egg presented by pairs of students. Prepare the whole TrT to hand out to the class the next time.

B. Check over the TrT for the math problem they were assigned. Keep examples for future use.

LESSON PLAN 8 —TOPIC: Finding the Core Conflict using the 3 Cloud Process

I. Aim or Goal of the Lesson: Students will use the 3 Cloud Process to identify and resolve the Core Conflict in any complex situation.

II. Essential Questions:

A. What is a Core Conflict?
B. What is the 3 cloud process?
C. When is the 3 cloud process needed?

III. Teaching/Performance Objectives to achieve the Goal

A. Students will develop UDE's for a complex situation.
B. Students will create 3 clouds using the most important UDE's.
C. Students will use the 3 clouds to create a generic cloud, and will resolve the conflict.

IV. Learning Activities

A. Time Frame: 1 50-minute session
B. Learning Resources (Readings, Handouts, Slides, Demo's)

Reading—NO: 2.7-2.10
Prepare Cloud templates on Powerpoint to use during Class.
Bring Post Its for the class.

C. Teaching Methodologies;

Lecture
Guided practice

D. Topical Outline
Review of previous lesson: UDE, Cloud, injections, assumptions; if a personal cloud was assigned, go over the clouds.
Overview of current lesson
Three Cloud Process: Sometimes, our problems seem to involve the whole "system" we find ourselves in, not just a specific interpersonal conflict, e.g., our family, Medgar Evers College, our job. We could focus on one conflict at a time, but we might find that conflicts have something in common, and that we could be more effective if we dealt with their commonalities as part of the system. The Three Cloud process allows us to figure out what the CORE conflict is, that is, the conflict which underlies ALL the problems with the system.

a. Research has shown that however complex a situation seems, you only need to consider 3 key issues (UDE's) in your search for the Core Conflict.

<u>List all the UDE's</u> in the situation.

b. Guided Practice 1: Have the class agree on a system they find themselves in where things are not going well (work, home, school). Using EXCEL (or Ppt) to show them to the class, have each person offer an UDE for the situation. Make

sure they are correctly stated. Have them write their own UDE's and turn them in on Post It's. You will use these in the next lesson.

Create a cloud for each of 3 of the most important UDE's.

c. Guided Practice 2: Have the students pick the 3 most important UDE's. It helps if they are chosen to represent different people's perspectives on the situation (e.g., boss, worker, customer; student, faculty, administration). Put the students in Groups of 2-3. Have them write down the 3 UDE's and create a Cloud for each one. Have them present their ideas to the class for feedback. Pick the best ones to put on the board, or if you are good with Powerpoint, and have prepared a Cloud template, put them into Cloud format in PPt. They should turn in their Clouds.

Use these 3 clouds to create a generic, Core Cloud. The Core Cloud should be general in nature and capture the essence of the 3 clouds.

d. Guided Practice 3: Start with D, then D', followed by B, C, and A. Present D for each cloud and have each group try to come up with a general statement that summarizes or includes all of them. Emphasize that this is tentative and will have to be checked later on. Do the same for the other parts of the cloud. Present the final Core Cloud. Check it against the original clouds to see if it makes sense.

Uncover the assumptions linking A-B, B-D, A-C, C-D', D-D'.

e. Guided Practice 4: Assign groups to deal with particular parts of the cloud, and to report back with the assumptions they have developed. Capture these on Ppt or EXCEL.

Come up with a good idea to break the conflict.

Guided Practice 5: Ask the groups to come up with injections to break the Core Cloud at each point.

Connect all the UDE's to the Core Cloud, using negative branches, to complete the picture of the current situation. Connect all the DE's (logical opposite of UDE's) to the Core Cloud using positive branches to describe a desired future situation.(These will be done in the next lesson).

Summary of current lesson

Preview of next lesson: Current and Future Reality Trees, time permitting, if the CORE conflict is put toward the end of the workshop.

V. Assessment/Evaluation of Learning

A. Review UDE's for correctness.

B. Evaluate the clouds.

LESSON PLAN 9 —TOPIC: Current and Future Reality Trees—What to Change & What to Change to

I. Aim or Goal of the Lesson: Students will use positive and negative branches to describe their current situation and to map out a better future.

II. Essential Questions

A. How are the student's UDE's all connected to the core conflict?

B. How are the student's DE's all connected to the core conflict?

C. How can negative branches and feedback loops be trimmed and positive branches and feedback loops sustained through injections?

III. Teaching/Performance Objectives to achieve the Goal

A. Students will use sufficiency logic to create negative branches from UDE's arising from one side of their conflict (Current Reality Tree)

B. Students will trim a negative branch to break a negative feedback loop

C. Students will use sufficiency logic to create positive branches from DE's arising from the other side of their conflict (Future Reality Tree).

IV. Learning Activities

A. Time Frame 2-3 50-minute session

B. Learning Resources (Readings, Handouts, Slides, Demo's)

1. Reading: NO—3:78-81
2. Post Its for the class
3. Smart Cart with EXCEL
4. Plan to have students take the post test in Math in the computer lab, and the MSES and Do you Believe survey in class.
5. Have students bring their UDE's and CORE CLOUD from previous session.

C. Teaching Methodologies

1. Lecture/ demonstration
2. Class participation
3. Guided practice
4. Individual practice

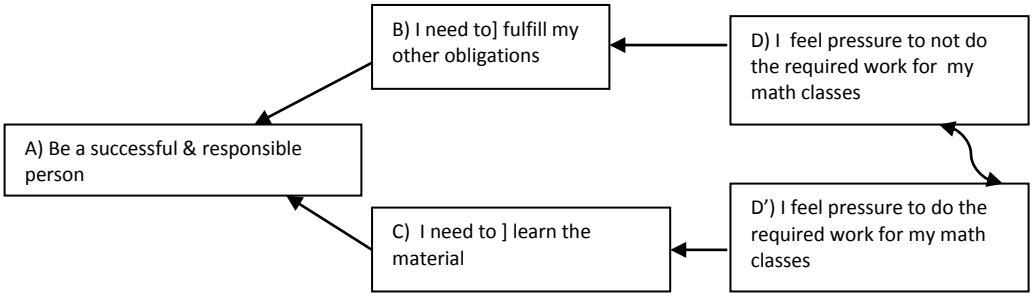
D. Topical Outline

1. <u>Review</u> of previous lesson: UDE, Cloud, positive/negative branches, injections, PRT, TRT. This lesson brings together many of the previous lessons and assumes that the student understands the basics of a cloud, positive and negative branches, and injections. This will be a review of the CRT (you probably should create another example), applied to the core conflict, but the Future Reality Tree will be new.
2. <u>Overview</u> of current lesson
3. <u>Implications of the Cloud</u>. One of the virtues of the cloud is that the core conflict (D) turns out to be connected to most if not all of the UDE's in the current situation (the Current Reality Tree). Ideally, we would like to remove as many of the UDE's as possible with injections. Similarly, the other side of the conflict (D') is connected to the desired future outcomes (DE's), the Future Reality Tree. The latter is a map of where we want to be in the future. We want to find ways to make this positive future a reality.

4. Start with the UDE's. Let's review a previous example. Suppose Monique is having trouble attending her math classes on time. In discussions with her advisor, she mentions a number of other issues that she is having with math (the class may be able to come up with these themselves). They could be put in one column of an EXCEL workbook in preparation for the rest of the lesson:

a. I can't follow the lecture.
b. I believe that I am not capable of doing math.
c. I don't work hard in math.
d. I don't do the homework or prepare for class.
e. I do poorly on tests.
f. I feel that the exam is too hard.
g. I have difficulty learning the math material.
h. I have difficulty taking tests.
i. I don't attend my math classes regularly.

5. Consider the CORE Cloud that was created using the 3 cloud method from 3, 4 and 9 above.



6. Current Reality Tree—What to Change. Review of this concept, as applied to the core conflict. Starting with D, we use sufficiency logic, "If…then, " to connect all the UDE's to D (see p79). (It's amazing how they all fall into place!) This is a negative branch. It is also a graphical description the current reality of Monique's bad situation in math that has arisen from D, the pressure she feels to NOT do the required math work. It gives us some idea of what needs to be changed in her situation.

a. Guided Practice 1: Put 2-3 students in a group and have each group write D and the UDE's with their numbers on the non-sticky side of Post Its. Have them create negative branches using ALL the UDE's arising from D. Ask for volunteers to read their branches. Once they have done this, and assuming that no one has developed a loop, show your arrangement as another alternative.

D→4→7→9→5→6→2→3→1→4

Ask the class if they see any interesting pattern here. In the particular case, there is a negative feedback loop: the less homework/preparation she does, the less

she can follow the lecture and the less homework she does. If nothing is done to break the loop, it will continue cycling downward, with disastrous results for Monique. Note that not all CRT's/branches end in a loop! Ask the class to propose injections at several points to break the loop (trim the negative branch), e.g., the prof could give her practice tests (between 5 and 6).

7. Future Reality Tree—What to Change to. This tree uses sufficiency logic to map out what a desirable future would be for Monique.

a. Guided Practice 2: Put the students into groups of 2-3. Take the list of UDE's above, and have the class change them into their logical opposites, DE's. Put them into the second column of the EXCEL workbook. Have the students write down the DE's with their numbers and D' on the non-sticky side of a PostIt and connect them using sufficiency logic. Have them read their positive branches. Assuming that no one has identified a loop, present your version as an alternative:

D'→4→1→3→6→5→8→7→2→1

Ask the class if they notice any pattern here. This is a positive feedback loop: the better she follows the lecture, the more capable she feels of doing math and the better she follows the lecture. But how can Monique turn this grand plan into reality? She can use the Prerequisite Tree, discussed earlier.

b. Independent practice 1: Have the students take their own UDE's and CORE Cloud and create the corresponding Current and Future Reality Trees. They should identify any loops that may exist, and provide injections to trim the negative branches. Collect this work.

c. Independent Practice 2: Using the FRT, have the students identify any positive feedback loops, and create one or more PRT's to reach the key DE's,. Students should provide the Obstacles, Intermediate Objectives and the Tree itself. They should create at least one TrT to reach one IO in one PRT Collect this work.

8. Summary of current lesson
9. Summary of the workshop
10. Have the students retake the MSES , Do you Believe and the Math post test.

V. Assessment/Evaluation of Learning

A. Evaluate the CRT's, FRT's ,PRT's and TRT's. They should show progress from their first attempts. Students should turn in their completed portfolios for our evaluation of the workshop.