Staff Development in Critical Thinking Skills for Secondary School Teachers across the Curriculum:

Definition and Concept-Development

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I t is not often that a collaboration in staff development between a school district and a University lasts long enough to allow for refinement and adjustment of design on the basis of experience. Pace University with the Lakeland Central School District has been fortunate, however, to have participated in eight years of training secondary school teachers to infuse critical thinking into classroom teaching. Funded by a series of Goals 2000 grants, the school system has each year, through University trained secondary school teachers, diffused staff training in turn-key mode to additional teachers in the district.

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Out of this attempt to provide effective staff development for the infusion of critical thinking into subject classes 7-12, important guidelines for such training have become clear:

A. Each skill should be taught to teachers «in the round,» that is, presented in all aspects that can inform content classroom teaching[1].

B. The primary consideration for presentation should be the way the

skill appears through a teacher's mindset.

C.The question of feasible workshop time must be considered and skills have to be combined accordingly.

JUST WHAT DOES IT MEAN TO «COVER» A CRITICAL THINKING SKILL IN A TEACHER

WORKSHOP? A KEY QUESTION FOR STAFF DEVELOPERS IN CRITICAL THINKING

Establishing the territory to be covered is key because staff development workshops that attempt to infuse critical thinking into instruction across the secondary curriculum are often too restricted in conception. They fail to take into sufficient consideration the educational profile of the under-achieving students whose performance the teacher workshop participants are usually seeking to improve and do not address sufficiently the profile of secondary school teaching itself. To be successful, staff development in critical thinking has to take thinking skills deep into the classroom.

The path lies, first, in the individual teacher's conception of what a particular thinking skill involves. If teachers interpret a skill too narrowly, they will not recognize its full teaching implications. For several skills there are what we might call creative and critical dimensions. One path (creative) unleashes the energies of the mind, showing us how to break through barriers, while the other path, (critical), guides or channels mental energies along deliberately selected paths.

What we are seeking in these terms - creative and critical - is a way to characterize the dual and complementary capacities which good thinkers have and which novice thinkers can learn. If we want to help teachers improve their students' thinking/learning, we need to enable them to enable their students to become reflectively creative and critical. Definition is essential for this. How?

HOW SHOULD A TRAINING WORKSHOP PRESENT THE CRITICAL THINKING SKILL OF DEFINITION CREATIVELY, CRITICALLY, AND FULLY FOR TEACHING PURPOSES?

This skill, rightly taught to teachers after they have studied the skills of perspective and classification, can help improve students' comprehension skills. However, to accomplish this goal, teacher workshop presentations must be comprehensive.

The common and central aim of critical thinking in definition is to make participants aware of the essentially arbitrary, i.e., constructed, nature of word definition and concept formation. This is a liberating process. It encourages people to think for themselves and to test the «given» truths of the world. Participants in most «Definition» sessions of critical thinking workshops learn that «the word is not the thing,» that definitions, the verbalization of the aspects of the meaning(s) of a word, like language itself, are man/made, and, therefore, subject to alteration and remaking. According to Wilson, «When we talk, in a kind of shorthand, about `the' meaning of a word, we refer to those significant elements in all the man)ᐟ and various usages of the word which make the word comprehensible, to the area of agreement amongst users of the word» (Wilson, 54). And, «a definition is some word or phrase which is linguistically equivalent to what is being defined – a translation, as it were, of one word into others» (Wilson, 64). Their attention is also drawn to the dangerous thinking implications of the copula, «the `is' of identity, which implies that one «thing» can exist in the `real world' as another (e.g., Joe is a liberal: he is a criminal.)[2] This language pattern traps us into muddy thinking, suggesting that whatever is on one side of the verb «to be» equals of is the same as whatever is on the other side. Teachers learn

that this apparent equivalence is, however, strictly grammatical since, as in the example above, Joe is, at least, a man and presumably many things (father, wager earner, golf player,) other than or in addition to being a liberal. Yet, it is easy, conditioned by this syntax, to think of Joe as wrapped exclusively in a political banner, and to judge him according to our taste or distaste for whatever we mean by liberals.

If a definition workshop is successful, teachers learn that the syntax of definition and word meanings, themselves, can be misleading, subjective and/or motivated by a writer or speaker's feelings or purpose.

They learn that a non-critical thinker can be manipulated by words, while critical thinkers, who harbor a healthy suspicion that words are tricky and mean different things to different people, are more likely to question others for a definition of terms. They are more likely to say, «What do you mean by ...?» before they attempt to agree or disagree with a statement. Effectively taught, definition workshop participants usually see the need to establish some consensus about definitions before participating in discussion or argument, written or oral.

These insights into the nature of definition are necessary for the clear thinking of teacher and students, but not sufficient for today's classrooms. They address only the first half of the skill. Learning to interrogate, rather than blindly accept meanings, provides a fundamental framework for thinking about language, but it presupposes a prior capacity, that is, the capacity to discover and work with the meanings and definitions of words and their relations to concepts in the first place, a fine example of this being Plato's *Euthyphro*[3].

However slippery and unstable in their nature, we are bound to use words to get on with the business of communication. Words, as critical thinking enables us to be aware of, can certainly be what we make them[4], but in order to participate adequately in a discourse community, students must know something about how they are made and function. They need to know about how words work so that they are understood by other users of words. This capacity might be called the «critical» half of the skill.

Of what use is it to teach students to suspect definitions if they do not understand what they are? Of what use is instruction in questioning definitions if students can not recognize personal definitions, dictionary definitions, extended definitions, and negative definitions when they see or hear them? Of how much use is the insight that meanings must be questioned, not just accepted, if students can not generate definitions in assigned speech or writing tasks? Without these associated skills, insight into the arbitrary nature of language will be of little help in academic work. The thinking skill of definition, as well as its companion skill, the formation of concepts, should be presented as a whole to teachers in staff development programs so that it can be taught as a whole in their classrooms.

Specifically, a full-training workshop in Definition would teach teachers how to integrate into their content teaching, a consideration of informal as well as formal (dictionary) definitions (class and differentia) of important content words. Spending a few minutes on the basics of formal definition,

denotation or the notion of a word belonging to a class or a category as well as having different attributes from others in that class is particularly valuable. It builds on thinking already presented under the topic of classification and it paves the way for another thinking pathway, comparison/contrast. Staff instruction in across-the-curriculum use of Definition might also include a brief glance at the etymological roots of essential content vocabulary, looking for clues to the essence and the history of the subject being taught.

Teaching definition of core words in content lessons also means briefly exploring with students how certain key word definitions might be affected by connotation and contexts including grammar. «Picture this!» «A pretty picture.» It means, as well, presenting or eliciting synonyms, contrary meanings or antonyms, and examples that will help fix specific definitions in the minds of students. All of these activities will at the same time, expand student understanding of how language and thinking work.

Teachers trained to attend to definition in their subject field would have students examine the way their own textbook uses core content words, comparing the text's usage and syntax with definition sentences and usage by other writers in the fields[5]. Less skilled student readers, in particular, need brief lessons on how to find definition clues and structures in their reading.

While the «is» sentence structure has to be approached with the knowledge that it is suggesting a completeness that is not so, the common way of defining and identifying uses the «to be» form. Good readers can skim material quickly, looking for definitions and identifications because they recognize characteristic definitional syntax such as we see in the following sentences that identify and define through positive and negative appositives, relative clauses, and parts of the «to be» verb.

An American doctor, James, and a nurse, Smith, discovered a new drug useful in the treatment of HIV positive children.

My brother Henry, who denies the truths of all religions and does not accept the existence of God, is an atheist, not an agnostic.

Good readers also pay attention to sentences that contribute to definition by giving illustration or examples introduced by such words as thus, for example, to make my point clear, to illustrate, for instance, etc. Weaker readers need to have their textbook's sentence level clues to definition emphasized by their teachers. The secondary school teacher today must be ready to meet students wherever they are within a specific thinking skill, and definition is no exception. For some students a «read through» of a chapter or part of a chapter focusing on the way the text presents definition will contribute significantly to content study skills.

In sum, vocabulary study often perceived by students as «unimportant» or «dry» when taught abstractly as «study skills» becomes immediately practical when «defining» is part of content and makes understanding the essential material easier. Without explicit exposure to thinking about definitions in

a content subject, the average or below-average student today is not likely to learn to think in and use the language of that subject. But not many classroom teachers address definition issues at even the most basic level - for example, beginning a school year with the obvious question - What is history? What is mathematics? What is a «foreign» language? Training can make a difference.

Training in definition can sensitize teachers to prior knowledge and misunderstandings that hamper student learning. (The word «market» for example has a different meaning for economics, marketing class, and the kitchen. «Work» does not mean the same thing in physics as it does at the business office.) Teachers learn the importance of eliminating irrelevant associations and definitions from the minds of weaker students before they try to teach them new meaning.

Good staff development in thinking skills should provide the teacher with a number of strategic ways to facilitate content instruction through the critical thinking skill of definition and to teach the thinking skill of definition through content instruction. Starting from a broad understanding of the nature of defining, teachers in effective workshops would learn how to translate the implications of what they have learned into classroom particulars. They would learn how to build skills through assigning student practice, such as writing their own brief examples, summarizing from multiple definitions, and using definition in tasks that require application. [6]

Also, the definition workshop would be the logical moment for instruction in vocabulary building techniques, such as using new words when appropriate, pausing for emphasis, and then rephrasing what has been said in familiar language. Teachers should also be taught to rephrase student responses (teacher saybacks) using the new vocabulary. Word study should be cumulative. Each teacher should maintain a list of new vocabulary words, and see that those which will reappear on exams are referred to occasionally in class work or assignments.

To accomplish these objectives, effective staff development workshops in definition would include materials, methodologies, and sample lessons created by other teachers to address the definition skills described above. Every secondary school teacher should be accountable for and trained to teach the vocabulary of his or her subject and the means to access it. [7]

HOW DOES A DEFINITION WORKSHOP CONTRIBUTE TO THE TEACHING OF CONCEPTS?

Complete workshops in definition as a critical thinking skill give teachers the opportunity to contemplate what is involved in defining. Teachers develop appreciation, not only for the role of vocabulary in discipline instruction, but also for the definition skills involved in teaching beyond word definition to new concepts, the second part of the training workshop. According to Wilson, «when we talk of the concept of (some)thing, we are really referring to all the different concepts of that thing, which individual people have, and to the extent to which these concepts coincide» (Wilson, 54).

Each subject or discipline includes nodal concepts, which may or may not be identical to the published curriculum of a course. For example, the curriculum of a half year high school American Literature class may list works of literature anywhere from the first book written in English in the new world, (by John Smith, 1608) to Emily Dickinson's poems. But if that literature class is to be effective, a number of concepts underlying the comprehension of these works, concepts as diverse as -poetry - individualism - (a self-made man a la Franklin, or self reliance as per Emerson, etc.), and irony - will also have to be taught. Learning to understand the concept of poetry, for example, will involve learning the limits or boundaries of its range of meaning by examining different applications or uses of the word, and the justifications for these applications (Wilson, 58-59).

Teachers, indeed departments at secondary level, need to be able to identify the concepts that are essential to their subjects, isolate them for attention, and model the ways involved in developing and explicating them by using the dimensions involved in defining the terms used to express the concepts. Most school room concepts, generalized ideas of a class of objects, thoughts, or facts, are not quickly explained by saying they mean this or that. There is usually no one meaning, but rather, there is an area of meaning to be tapped (Wilson, 26). How then do we teach teachers to enable their students to form concepts and not merely manipulate words?

After they have encountered the various dimensions of definition as described earlier, workshop teachers are taught to approach concept teaching by using vivid initial examples and analogies from familiar contexts, followed by examples from new contexts. By comparing the features of a number of teacher-offered good examples, students learn to identify essential characteristics that define the concept, - e.g., for private enterprise Mom and Pa's Deli or Yahoo, for democracy France or the United States (Wilson, 28). Teachers learn to choose «primary and central» rather than borderline examples of the concept at the start of a lesson (Wilson, 27). They learn to elicit and test student examples, adding contrasting examples, say the Internal Revenue Service or Cuba, to help pin down essential and identifying features of a target concept (Wilson, 29).

Borderline examples are introduced so that features of the true or exact example will stand out for students - e.g. for private enterprise, Pace University or for democracy, The Vatican. Further, once these features are reasonably clear, teachers would learn to introduce partially related concepts so that students can see how they fit in with the target concept e.g. for private enterprise, a wrist watch or the Academy Awards (Wilson, 30).

The significance of modeling ways of explicating concepts lies not only in the development of students' abilities to understand the nodal concepts of a subject or discipline rather than merely manipulating words, but also to utilize their developed abilities in personal as well as academic interests. For example, in considering the morality of abortion, «Is abortion morally right or wrong?», the discussion may center on the question, «Is the fetus human?» If it is, then abortion may be morally wrong. If it is not, then abortion may not be morally wrong or murder if only humans can be murdered. Hence, the discussion can turn on a definition of «human.»

In a definition and concept workshop, teachers should have the opportunity to develop and share model examples for the concepts in their discipline. Examples are the heart of concept teaching and «Just as fine painting is seen as beautiful because it has certain elements, such as balance, rhythm, and harmony, so does a fine example communicate because of accuracy, clarity, and attractiveness.» (Melon and Massa, 13) and hence enable students to develop their own independent abilities to learn, absorb, and communicate new concepts.

HOW MAY TEACHERS IMPLEMENT WHAT THEY HAVE LEARNED ABOUT DEFINITION AND CONCEPT DEVELOPMENT?

From staff training in definition, individual teachers will develop different and unique ways of incorporating the various dimensions of definition into their lessons. They may start with drawings, pictures, words, readings, as well as personal or traditionally authoritative definition and proceed in ways guided by a verbal or written organizational structure. For example, as an introduction to the term quadrilateral in math, one teacher, in our training group, had her class draw figures that had four sides and then discuss what all the different drawings had in common. After they observed each other's work, they were asked to write individual definitions. The class then compared their definitions with a dictionary definition.

In a social studies class for lower performing students, a teacher tested students' understanding of Gandhi's idea of civil disobedience by asking them to draw, find in magazines, or create (using cut-outs) scenes depicting civil disobedience. They were then asked to write out a definition that would apply to all of their examples. For a physical science class, one teacher provided unlabeled pictures of various simple machines and asked students to label the pictures, choosing from a list of terms. They were then asked to find information from their texts about the function of each one. Finally, they were asked to give an operational definition of the items, such as a pulley, a lever, and an axle.

In a life science class, one teacher taught the process of definition in connection with science terminology in her science classes. She started off by presenting roots and prefixes used in science and then narrowed the list down to roots and prefixes of words commonly used in her life science class. This activity, she felt, gave students a basic familiarity with some of the words that they would have to define.

To implement the definition process, she developed an organizer that enabled students to move from critical attributes, through examples, to definition.

Word   **Scientific Category**

Protists

    Critical Attributes

Examples   **Non examples**

Definition   **Symbol or Drawing**

This was a combined individual and whole class activity. The class as a whole decided on the category. Students read their texts at home and filled in the critical attributes for Protists -Their lists were reviewed and amended in class and examples and non-examples were elicited from class discussion. Then students individually made a drawing or symbol and wrote out definitions which were reviewed in class. The teacher commented that the lesson made her realize how many pre-fixes and suffixes are found in science words that she uses every day, and that having students fill in non examples reduced the number of errors on quizzes.

In an 8th grade social studies class on World War 1, one teacher asked students to complete a definition chart after reading assigned text pages. The 3-column organizer required them to give the definition of a key word in the text and then explain why or how that word is important or significant according to the pages they read.

Vocabulary   Word   Definition   Importance

The teacher commented that students seemed to enjoy the activity and internalized the vocabulary words.

A high school computer keyboarding teacher introduced her unit on preparing resumes by asking students to write their own personal definitions of the word resume. Responses were discussed in class and a consensus was reached on what they meant by the word. The teacher then read two formal (dictionary) definitions to the class. The teacher commented that the students were pleased that their definition was so close to the formal definition in the dictionary. She also reported that the class was very attentive in the resume lesson that followed.

Finally, a 10th grade English teacher, Sue Eriksen of Walter Panas High School, used a traditional authoritative definition of a word, «tragedy,» in relation to the study of Macbeth to integrate much of a year's work and promote conceptual development. In her words,

Upon completing the reading of the play, I felt it was important for the students to understand the meaning of tragedy. Rather than simply give them a definition, I proposed that we work backwards with Aristotle's definition; proving that Macbeth was indeed a tragedy.

While the actual definition given by Aristotle may have been a little unwieldy for the students, I broke it down into seven parts, asking the students to individually confirm each part.

She enabled her students to do this by giving them two homework assignments in organizational form dealing with the character Macbeth. The first was the following:

Homework - **#1**

Macbeth changes from a proud hero in Act 1 to a cruel tyrant in Act V. The change is shown by his actions, as well as by what others say of him. In the chart below, compare MacBeth's attitude towards each person listed, before and after he becomes King.

Macbeth's attitude toward:

Banquo   *Before*   *After*

Lady Macbeth

The Witches

In the chart below compare the characters' opinion of Macbeth before and after he becomes King.

Banquo   *Before*   *After*

Lady Macbeth

The Witches

The second was the following:

Homework - #2

Tragedy moves an audience to sympathy. If Macbeth were nothing but the story of an evil man and his violent crimes, it would not have the power to move us as it does. The central figure of the play is a tragic hero - a basically moral person, often of noble stature, whose downfall usually results from a bad choice. The bad choice stems from a tragic flaw in the hero's character. If Macbeth's «bad choice» is killing Duncan, what do you think is his «tragic flaw»? In other words, what do you think is the reason Macbeth decided

to kill Duncan and the others?

She gave them Aristotle's definition of tragedy, 1. the serious story, 2. of a good or great man, 3. who has a single weakness or tragic flaw, 4. something he could overcome, not fate. 5. He gives into his flaw, 6. knowingly and willingly, 7. and therefore, suffers and receives punishment.

And then she provided them with the following organizer to decide whether, given Aristotle's definition, Macbeth is a tragedy.

The serious story

What makes Macbeth a serious story?

of a good and great man

Give examples of how Macbeth is seen as a good or great man in the beginning of the play. (Use your homework assignment)

Who has a single weakness or tragic flaw

 (Use your homework assignment)

something he could overcome not fate.

How could Macbeth have changed the outcome of the story? What could he have done or not done to overcome his weakness?

He gives into his flaw

List Macbeth's actions that contribute to his downfall.

knowingly and willingly

List the reasons Macbeth gives for actions you've just listed.

and therefore suffers and receives punishment.

List the results of those actions on Macbeth. How do those actions affect Macbeth?

CONCLUSION

Incorporation of the various dimensions of definition into classroom lessons facilitates the students' reflective, creative and critical thinking. A classroom emphasis on concept formation, definition, awareness of perspective and classification enables both teachers and students to think more effectively in testing the «given truths» about the world.

NOTES

1. See Edelson, P. and Vallone, G., (November 1998) for a discussion of infusing critical thinking skills into the classroom through «end labeling.»

2. This is quoted from the materials of Rachel Lauer, Director Straus Center for Teaching and Learning, Pace University, whose workshops on critical thinking integrate dimensions of General Semantics. The Pace/Lakeland staff training uses many of Dr. Lauer's material, and she, herself, led several early workshops.

3. For an engaging user-friendly edition of the *Euthyphro* see Christopher Biffle's *A Guided Tour of Five Works By Plato.*

4. A humorous example of this may be Humpty Dumpty's conversation with Alice. «The question is,» said Alice, «whether you can make words mean so many different things.» «The question is,» said Humpty Dumpty, «which is to be master - that's all.»

5. This can be seen even in high school and college textbooks dealing with critical thinking. For example, in differenciating between the external world, what is sensed and what is thought, Robert Potter in *Making Sense: exploring semantics and critical thinking* uses events, objects, and labels. In college texts, James Christian in *Philosophy: An Introduction to the Art of Wondering* uses reality, sense, and thought. While John Wilson in *Thinking With Concepts* uses world, things, and concepts.

Potter: Events Objects Labels Christian: Reality Sense Thought Wilson: World Things Concepts

6. See Elelson, P. and Vallone, G. (April 1998) on the role of student brief writes in the Infusion of Critical Thinking Skills Across the Curriculum

7. For a sophisticated and comprehensive presentation of how this may be done for «acceleration» in science see Reif and Allen's article «Cognition for Interpreting Scientific Concepts: A Study of Acceleration.»

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