Back to Knowledge: The Ironic Path of Teaching Thinking

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Abstract

The article follows the conceptual path made by the teaching thinking movement. It emerged as a reaction to the explosion, obsolescence, availability, and relativity of knowledge, as a call to teach thinking instead of knowledge, and returned to knowledge in the form of *the third approach* to teaching thinking — teaching for understanding. Understanding knowledge is the essential, perhaps even sufficient, condition for good — effective, critical and creative — thinking.

Key words: Thinking skills, thinking dispositions, understanding, understanding performances, mindware, educational environment fostering thinking

The idea was simple and inspiring: in the age of the explosion, obsolescence, availability, and relativity of knowledge it makes no sense to teach knowledge; it makes sense to teach *how to deal with knowledge* — to locate, process, criticize, and create knowledge, which means *to think*. Thus, within a short time – from the beginning of the 1980s – teaching thinking became a trend, and teaching knowledge became passé. Enthusiastic educational thinkers developed many theories of teaching thinking, so that the field suffers from the illness it was meant to cure — the explosion of knowledge. Anyone who wants to understand the field of teaching thinking or, even more so, to apply it in the classroom, is paralyzed by the abundance of theories of good thinking and its teaching (Cf. Harpaz, 2007; Harpaz, in press).

What, then, is to be done? First of all: order. We should sort out the theories according to their approaches (meta-theories) to teaching thinking (I suggest here a different "order" from the one I suggested in Harpaz, 2010). Then we should examine the approaches to teaching thinking and, from that examination, derive several useful insights. One insight, which is central to the following remarks, is that *teaching thinking has followed a rather ironic path — first rebelling against knowledge and then returning to it; it tried to bypass content but was trapped in it*. Let's follow the path taken by teaching thinking.

Give the Child a Fishing Rod! — The Skills Approach

The *skills approach* developed first – a complex of theories that arose around the claim that the factor that produces good thinking (Perkins called it "mindware") is thinking skill. If you want students to think well — deeply, systematically, critically, creatively, etc. — you have to equip them with thinking skills. These skills, and not bodies of knowledge, must be central to the curriculum, teaching, and learning. Knowledge, so claimed the *skills*

approach, has an expiration date (which is not marked on the label, but it's certainly soon), whereas thinking skills have an eternal shelf life. Thinking skills — strategies, techniques, heuristics, etc. — are tools for dealing with knowledge, which don't wear out; these tools may be used, among other things, but mainly to criticize knowledge (and to determine its expiration date) and to create new knowledge. In other words, "Give the child a fishing rod — thinking skills — and not fish — knowledge!" (For the record, this sound bite, "give the child a fishing rod!" is one of the favorites of Israeli prime ministers when they talk about education. It is based on the proverb attributed to Lao Tzu, "Give a man a fish and you feed him for a day. Teach him how to fish and you feed him for a lifetime.")

The skills approach caught on quickly, and the market filled up with various thinking skills. Why not, after all? What sells better than simple skills for upgrading thinking? However, it should be noted that the term, "thinking skill," while certainly the most prevalent term in the discourse about teaching thinking, is ambiguous and confusing because it includes both the thinking tool and the way it is to be applied — skillfully, rapidly and precisely. What follows are some examples of thinking skills approaches.

Tools for Lateral Thinking

Edward de Bono is the most prolific producer of thinking skills or, as he calls them, *thinking tools*. His CoRT (Cognitive Research Trust, cf. de Bono, 1991) includes a cluster of thinking tools — instructions for a certain mode of thinking labeled with initials — whose purpose is to produce *lateral thinking:* thinking that breaks out of routine patterns ("thinking out of the box," "breaking paradigms thinking," "breakthrough thinking," and other clichés). For example, PMI (Plus, Minus, Interesting). Whenever you encounter a new idea, apply PMI to it. Ask whether it is positive, negative, and interesting. Or, APC (Alternatives, Possibilities, Choices): Whenever

you make unusual decision or suggest an explanation, see whether you have exhausted the field of alternatives, possibilities, and choices given to you. There is also OPV (Other People's View): Whenever you are about to make a significant decision, think about what other people will think about it; they doubtless have other points of view and they are liable to make trouble for you.

Since people don't think alone — thinking is a social activity (and even when we think alone — Plato called thinking "the conversation of the soul with itself" — we think in concepts and images that we have internalized) — de Bono (1993, for example) developed tools for group thinking. The most popular tool is called The Six Thinking Hats. Each hat represents thinking focused on certain content: the white hat is thinking focused on facts (relevant ones to the issue under discussion); the red hat is thinking concentrated on emotions (which the issue raises); the black hat is thinking based on "negative" judgment (the flaws of the idea); the yellow hat is thinking concentrated on "positive" judgment (the advantages of the idea); the green hat is thinking focused on creativity (of new ideas); the blue hat is thinking focused on itself (thinking about the process of thinking that was done in the group). The underlying idea of the hats is *parallel thinking*. That is to say, if you are participating in a meeting and reaching a decision, think in parallel. First everyone thinks white, then red, then black, etc. If you think that way, de Bono promises, the thinking will be more effective, and the decision wiser.

De Bono's thinking tools are mainly basic rules of thumb for thinking, which are similar to the rules people give to themselves by means of folk proverbs or common sayings. Their main advantage (in my opinion) does not lie in themselves, but rather in the suspension of judgment they occasion: when you employ thinking tools, you delay a little before passing judgment, deciding, or agreeing ("Haste is from the Devil," says the Hebrew proverb), and delaying is usually good for thinking. So here is a home-made thinking tool: TBJ (think before judging).
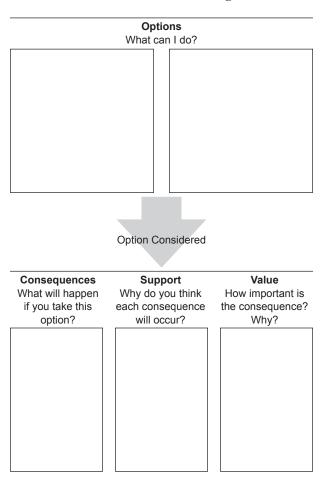
The Infusion Strategy

Robert Swartz and Sandra Parks (1994) are the progenitors of the infusion strategy. This system combines the teaching of thinking skills with the teaching of content, and, in its founders' opinion (as well as that of the Ministry of Education in Israel; see Memorandum of the Director General, September 2008), it is a win-win situation: thinking skills are learned in an "authentic" context of teaching content, and the content is enriched by a dimension that adds depth and interest to it (not to mention the principal advantage: no time is "wasted" on teaching skills in the framework of a subject, and no money is wasted on training and hiring "thinking teachers"). Swartz and Parks classified the skills into four categories: clarifying ideas, generating ideas, assessing the reasonableness of ideas, engaging in complex thinking tasks. To make the teaching of skills

more effective, they invented "graphic organizers" and attached "guiding questions" to them. For example, here are guiding questions and a graphic organizer intended to help you with decision making (which belongs to the first category):

1. What makes a decision necessary?
2. What are my options?
3. What are the likely consequences of each option?
4. How important are the consequences?
5. Which option is best in light of the consequences?

Skillful Decision Making

Now let's say that you are history teacher using the infusion system, and you are teaching about some historical decision, perhaps one of those discussed by the historian Ian Kershaw in *Fateful Choices: Ten Decisions that Changed the World, 1940-1941* (2007). Suppose you are teaching about Hitler's decision to attack the USSR. At a certain point you halt the flow of events and teach the skill of decision making. You present the guidelines for making a decision to the students, and you ask: Why did Hitler make this decision? What did he see as the options available to him? What did he think would be the results of each of the options? And so on. Afterward you ask the students to fill in the graphic organizer. Fine! What have you done? Have you taught the students how to make in-

telligent decisions? Have you enriched the historical story with an important insight? I'm not sure. Maybe it would be better to teach the students how to make an intelligent decision on the basis of their daily life. Why seek evidence examples in the content of the curriculum? Wouldn't it be better to relieve the study of history and other subjects from the duty of teaching thinking skills, which spoil the flow and pace of the teaching of content? Maybe the teaching of thinking skills infused in the content of subjects is in fact a no-win situation.

As to the main question — not about the infusion strategy but about the essence of the thinking skills themselves: let's say that Hitler had been trained in the skill of making decisions with the infusion method, and he had answered the guiding questions properly and filled in the graphic organizer to the teacher's satisfaction. Would he have made a different decision? For example, would he have decided not to attack the USSR but rather to finish the war against England (as Stalin assumed he would do, so that he *decided* to ignore reports about an imminent German invasion)? Did Hitler's decision, which was destructive in every respect, derive from lack of skill in making decisions or from deeper causes, for example, his ideological fanaticism, his conceptual universe, his self-delusion, his wishful thinking (Dewey claimed that wishful thinking was the cause of all failures in thinking), his fantasies, his fears, his hatreds, his hubris – in short, his pathological personality? Making a wise or stupid decision comes from many factors; skill is one of the marginal ones and skills are relatively easy to teach and evaluate. But try to teach how to recognize and properly evaluate the truly important factors in reaching decisions. No easy task!

By the way, it should be noted that Kershaw's general conclusion is that the decisions made by the democracies during that period of the war were wiser than those of the dictatorships, because a democratic regime requires consultation with partners in power and consideration of public opinion. This illustrated an important point, namely that the quality of our decisions, like the quality of our thinking in general, depends not only on ourselves but also on the environment in which we think.

Informal Logic

This is a specific field that specialized in the development of thinking skills, a field with deep Aristotelian roots; it deals with the location, criticism, and structuring of arguments (Ennis, 1987; Johnson and Blair, 1994). The argument is the framework of our logical, rational thinking, and when it is valid — when the conclusion logically derives from the premises — that is from statements which are themselves acceptable — our thinking is "healthy." The ethical imperative of informal logic is *the commitment to give reasons:* a good thinker has an intellectual conscience that requires her to justify and validate her words by means of valid arguments.

The favorite branch of informal logic is *finding fallacies* – in your own arguments or (better) in those of your opponent. The most common fallacies are dual in nature: logical and psychological. Here are some examples:

> *Circularity* — basing a conclusion on premise that must itself be proven;
> *Appeal to authority* — basing an argument on the statement of a person as if his or her statement should be accepted as authoritative when it is not;
> *Bandwagon* — arguing that an idea is to be accepted because of its growing popularity;
> *Glittering term* — the use of prestigious concepts to make an impression;
> *Slippery slope* — the argument that warns that a minor incident will necessarily lead to a grave one ("Give him a finger, and he'll take the whole hand");
> *Post hoc, ergo propter hoc* — confusing priority in time with causality (the argument that A is the cause of B simply because A comes before B);
> *Ad hominem* — an irrelevant argument directed at a person in order to discredit his argument;
> *A Straw Man* — a distorted representation of the opponent's position to make it easier to attack it;
> *Either... or...* — dichotomous thinking (everything is black and white, with no shades of gray) that presents too few alternatives.

Indeed, skills in logical thinking, which are hardly taught at all in Israeli schools (Amos Oz, a renowned Israeli writer, wrote that Israel is actually not a state, a society, or a nation, but rather "a collection of arguments" [1998, p. 3]), are extremely important, and it could be that today, when young people have become called "Screenagers," they are more important than ever. Neil Postman claimed that television fills young people's heads with visuals which displace the syllogistic arguments from them (Postman, 1985). Thinking that does not take place in the framework of syllogisms is, in his opinion, degenerate (he predicted the decline of America because of too much television watching). Similarly, Gavriel Salomon (2009, and see also Skillen 2011) argued that the computer inflicts the "butterfly defect" on young websurfers: jumpy thinking that is unable to deal with a subject systematically and reach a conclusion from a series of assumptions. Whether or not this is true, logical thinking must be developed everywhere, constantly; logic is the structure of our thinking, and the structure needs rehabilitation and reinforcement.

Give the Child Bait! —
The Dispositions Approach

Fine, let's say we have taught thinking skills, directly or by infusion, and the students have mastered them, but suppose they are not *disposed* to applying their thinking skills in class or outside? They can do it, but they don't want to — what then? We look for way to work on their thinking dispositions; we transfer the educational gaze from thinking skills to the *motivation* to make use of them. Thus the *dispositions approach* arose. People think well, this approach claims, when they are motivated by good thinking dispositions (there are also bad ones — the opposite of the good ones). The imperative is thus: *Give the child the love and the need of fishing (dispositions to think, a bait (to the fisherman, not to the fish) and not (just) a fishing rod (thinking skills)!* Motivation, the bait to think well is inherent in the concept of thinking disposition, because a disposition is motivation, the desire, the drive to think in some productive manner (see the examples below).

However, the dispositions approach is not content with playing the secondary role of supplying energy for thinking skills. It wants to supplant the skills approach and replace the category of thinking skills as the basic category for understanding and improving thinking, with the category of thinking dispositions. Henceforth, the thinking disposition becomes the main "unit of analysis for cognitive behavior" (Perkins, Jay, and Tishman, 1993, p. 3). Of course a thinking disposition can make use of thinking skills, but skills alone do not assure good thinking, *even when there is* motivation to implement them. Good thinking demands deeper foundations than thinking skills; good thinking is influenced decisively by a person's intellectual traits — traits that have direct influence on the quality of thinking — and not simply by his or her thinking skills To paraphrase Kant's famous dictum, one may say: dispositions without skills are empty, and dispositions without skills are blind. In short, according to the *dispositional view of intelligence*, the essence of good thinking, the "mindware," is comprised of thinking dispositions. Here are examples of some of the approaches that emphasize thinking dispositions.

David Perkins's Seven Thinking Dispositions

David Perkins (1995, pp. 274-288) lists seven thinking dispositions, which he calls the "Seven Samurai" as well as "the soul of intelligence." In his opinion they include all the characteristics of good thinking, counterbalance one another (it is wrong to take any one thinking disposition all the way; the other dispositions are needed to restrain it), and reflect common cultural values:

1. Clarity: The disposition toward thinking that is clear, coherent, precise, specific and well organized.
2. Breadth: The disposition toward thinking that is broad, adventurous, flexible and independent.
3. Depth: The disposition to understand deeply, to seek underlying unities and hidden causes.
4. Soundness: The disposition toward thinking that is accurate, thorough, fair, knowledgeable, logical, and well supported by evidence.
5. Curiosity: The disposition toward thinking that is curious, questioning, probing and inquisitive.
6. Strategy: The disposition toward thinking that is strategic, planful, and uses devices to sustain effective organization.
7. Awareness: The disposition toward thinking that is metacognitive, aware of itself, and reflective.

Sixteen Habits of Mind

Arthur Costa and Bena Kalick (2000) listed sixteen habits of mind, which are vital to good thinking. Habits of mind "are defined as dispositions displayed by intelligent people in response to problems, dilemmas, and enigmas, the resolutions of which are not immediately apparent" (Ibid, p. xvii). Here are the habits of mind and the imperatives inherent in them:

1. Persisting: Stick to it. See a task through to completion, and remain focused.
2. Managing impulsivity: Take your time. Think before you act. Remain calm, thoughtful, and deliberate.
3. Listening with understanding and empathy: Seek to understand others. Devote mental energy to another's thoughts and emotions.
4. Thinking flexibly: Find a way to change perspectives, generate alternatives, and consider options.
5. Thinking about thinking (metacognition): Be aware of your own thoughts, feelings and actions — and how they affect others.
6. Striving for accuracy: Check it again. Nurture a desire for exactness.
7. Questioning and posing problems: Develop a questioning attitude. Find problems to solve.
8. Applying knowledge: Transfer the knowledge beyond the situation it was learned.
9. Thinking with clarity and precision: Strive to for accurate communication. Avoid overgeneralizations, distortions, and deletions.
10. Gathering data through all senses: Gather data through all your natural paths.
11. Creating, imagining, innovating: Generate novel ideas, and seek originality.
12. Responding with wonderment: Find what is awesome and mysterious in the world.
13. Taking responsible risks: Live on the edge of your competence.
14. Finding humor: Look for the whimsical and unexpected in life. Laugh at yourself.
15. Thinking interdependently: Work with and learn from others in reciprocal situations.
16. Remaining open to continuous learning: Learn from experiences.

Richard Paul's Nine Traits of Mind

Richard Paul (1992), writes about "traits of mind" for independent, critical, and fair thinking, and he compiled a list of nine:

1. Independence of Mind: the disposition and commitment to autonomous thinking, thinking for oneself.
2. Intellectual Curiosity: the disposition to wonder about the world.
3. Intellectual Courage: having a consciousness of the need to face and fairly address ideas, beliefs, or viewpoints toward which we have strong negative emotions and to which we have not given serious hearing.
4. Intellectual Humility: awareness of the limits of one's knowledge.
5. Intellectual Empathy: having a consciousness of the need to imaginatively put oneself in the place of others in order to genuinely understand them.
6. Intellectual Integrity: recognition of the need to be true to the intellectual and moral standards implicit in our judgments of the behavior or views of others.
7. Intellectual Perseverance: willingness and consciousness of the need to pursue intellectual insights and truths in spite of difficulties, obstacles, and frustrations.
8. Faith in Reason: confidence that, in the long run, one's own higher interests and those of humankind at large will be best served by giving the freest play to reason.
9. Fairmindedness: willingness and consciousness of the need to treat all viewpoints alike. This is the ability to reason without reference to one's own feelings or vested interests, or the feelings or vested interests of one's friends.

Paul's traits of mind are broader than Costa and Kallick's "habits of mind" and Perkins' thinking dispositions. However, the concept of thinking dispositions, the name we have given to the second approach to teaching thinking, is a broad one, which includes a world view, an attitude, a value, a trait, motivation, emotion, and other concepts that are related to the whole personality. The dispositions approach argues, therefore, that thinking is more than thinking; the intelligence is not what thinks; the whole person thinks. The dispositions approach brings thinking home, after it had been snatched away by the skills approach; and that home is very complex and difficult for education. It is relatively easy to inculcate thinking skills; it is hard to nurture thinking dispositions. Thinking skills, like skills in general, are acquired by imitation and practice; thinking dispositions, like personality traits in general, are acquired by identification (with real or imaginary ideal figures who embody them) and by internalization. Schools are set up for imitation and practice; they are not set up for identification and internalization.

Give the Child Fish! — Focus on a Deep Understanding of a Subject

So let us say that a certain person is motivated by good thinking dispositions and endowed with good thinking skills; will she be a good thinker? When a person *understands* the subject she is thinking about, her thinking is good — deep, systematic, critical, creative, etc.; when she doesn't understand, her thinking isn't good — it is shallow, scattered, closed, routine, etc. Thinking thinks content, and when it understands the content it thinks, it endowed with the most essential condition to be good. Understanding is therefore a basic prerequisite, perhaps a sufficient one, for good thinking.

The understanding approach grew out of philosophy and psychology, the two main disciplines feeding the field of teaching thinking. The philosophical argument is expressed by John McPeck, who repeatedly states the "obvious and commonsensical" ideas that (a) there is no generalized thinking, only thinking about something; (b) a good thinker on one matter is not necessarily a good thinker on another matter; (c) the quality of thinking depends on knowledge of the thought-about topic and on the discipline to which it belongs; and (d) teaching thinking must focus on teaching for understanding of the theoretical disciplines. In other words, good thinking of any sort — critical, creative or effective — is "parasitic upon the knowledge component" (McPeck, 1994, p. 111). The psychological argument arrives at a similar conclusion, but on the basis of empirical studies and psychological conceps. These studies and concepts conclude that the main factor of good thinking is knowledge, or rather the understanding of knowledge (cf. Perkins & Salomon, 1989).

There is no good thinking in a general way, good thinking about any subject in the world; there is good thinking about a certain subject — a subject that one understands. Let's say we've endowed you with the thinking skill of comparing and with a disposition for deep thinking. Now you are asked to compare impressionism to pointillism, or communism to anarchism, or theism to deism, but you don't understand any of those "isms." Is there any chance that you'll be able to compare them in any deep way? Let's say you are an expert in art history or political science of comparative religion, but you have never specifically learned the skill of making comparisons or consciously acquired the disposition to deep thinking; will you have any problem in making a deep comparison between subjects in fields you understand? The main factor in good thinking, the "mindware," about a given subject (or good thinking in general) is therefore an understanding of that subject. The imperative is thus: "Give a child fish (knowledge), or rather help him to konow his way around the fishing zones (areas of knowledge) and not (only) a fishing rod (skills) and the inclination to fish (dispositions)!"

Let's try to understand understanding. As Howard Gardner writes: "Understanding is a complex process that is itself not well understood." (Gardner 1991, p. 179) In the literature of teaching thinking there are two complementary conceptions of understanding: one as location and the other as performance.

Understanding as Location. According to this conception, to understand something is to place it in a context — people understand a concept, a rule, or an idea when they place it in the context of a network of relevant concepts. The denser the network, the deeper the understanding. If, for example, some one asks you, "What is democracy?" and you say, "Democracy is decision-making by the majority," we would say your understanding is superficial, because you only made use of one concept "majority rule," for understanding the concept of democracy. But if you give a long lecture about the historical development of democracy from ancient Greece to the present, if you explain clearly what the division of powers means, the rights of the individual, and the tyranny of the majority, and you discuss thoroughly the crisis in democracy in the age of globalization, we would say that your understanding of the concept of democracy is quite deep – you made use of many concepts to explain it (an explanation is an externalization of understanding).

Understanding as Performance. It is difficult to construct and evaluate understanding as location, because understanding is located in people's minds and people's minds (thank God) are inaccessible (even our own mind, as Freud taught, is inaccessible to us). Teachers therefore can't know whether the network of concepts in the student's mind is thin or dense. How, asked David Perkins (1998), can we make understanding into a public event, so that we can construe and evaluate it. He answered: let us redefine it as performance: to understand something is to perform publicly accessible processes with what we know — to interpret it, to provide an example of it, to criticize it, and so on. Perkins (1990) suggests seven understanding performances, and here I (Harpaz, 2008) offer a list of eighteen, divided into three categories. (Note that in this context understanding as location becomes one understanding performance among others.)

The understanding approach returns the teaching of thinking to knowledge: knowledge is not external to thought, as, for example, food is to eating; knowledge and thinking are intrinsically connected with one another. When the knowledge about which and by means of which we think is not understood, thinking moves in fits and starts; when knowledge is understood, thinking flows. Using a metaphor one may speak of three states of knowledge as solid, gaseous, and liquid. In the solid state, knowledge is attached to the context in which it is learned — the students grasp it strenuously and are unable to play with it, to transfer it from context to context, to do understanding performances with it (it is inert knowledge). In the gaseous state, the elements that comprise knowledge — concepts — are detached from one another, and there is no logical connection among them; the knowledge is not located in a significant context, and it does not move from context to context. In the third state, the liquid state, knowledge is understood and flexible and moves from context to context. The mind moves flexibly in areas where it knows its way around (Perkins proposes the expression "knowing your way around" as a metaphor for understanding) and demonstrates the desired qualities of good thinking. However, the understanding approach does not call for a return to the teaching of knowledge in the simple sense — continuing to stuff quantities of knowledge into the children's minds (as containers); it calls for *teaching for understanding* — teaching that strives to enable students to find their way around knowledge, to create connections between concepts, and to perform thought processes on the basis of knowledge. Teaching and learning for understanding demand a very different educational environment from that of the ordinary school.

A Typology of Performances of Understanding

Category I	Category II	Category III
To present knowledge	To think about and knowledge	To criticize and create knowledge
To express knowledge in your own words	To analyze and synthesize knowledge	To give reasons and justify knowledge
To explain knowledge	To apply knowledge	To expose contradictions and tensions in knowledge
To suggest interpretations of	To suggest examples, metaphors, analogies, comparisons	To question knowledge
To build a model for knowledge	To generalize from detailed knowledge	To reveal basic assumptions of knowledge
To represent knowledge	To contextualize knowledge	To formulate counter knowledge
To present knowledge	To predict on the basis of knowledge	To create knowledge on the basis of knowledge

Why Fish? — Reasons for Concentrating on Understanding

Of course the distinctions between thinking skills, thinking dispositions, and understanding knowledge are not absolute. There is a partial overlap among these categories and mutual relations. However, it is important to distinguish among them for the purpose of both understanding and action. Education does not want only to understand the world; it mainly wants to change it. Teaching thinking does not want only to understand thinking; it mainly wants to improve it. For that purpose it must ask

itself, "What will I concentrate on? On inculcating skills, on nurturing dispositions, or on building understanding?" Following most of the important theorists in the field, I also propose concentrating on understanding in the teaching of thinking — for theoretical, pedagogical, practical, and logical reasons.

The Theoretical Reason. most theories and studies of teaching thinking support the basic claim of the understanding approach: a person thinks well about and by means of the subjects that he or she understands. The thinking of experts is better (in their field of expertise) than that of lay people. According to the well known "ten year rule," a person must engage in disciplined practice in a field for about ten years (or 10,000 hours) before she begins to produce good thinking in it. (Ericsson et al., 2007)

The Pedagogical Reason. Teaching thinking is an important goal, but, while it is in the first row, it is not the first goal in line. Other important educational goals are also in the first row, such as understanding fields of knowledge and the world. With the understanding approach, you see two movies for the price of a single ticket: you understand the great ideas of the culture, and you learn to think about them and by means of them.

The Practical Reason. Schools teach knowledge organized into subjects and curricula. If teaching thinking wants to be accepted in schools, it has be consistent with this trend, but not by fitting in or adapting, by hitching a ride on the teaching of content (and sometimes spoiling it), but rather by effecting a change in the teaching of content — by means of teaching for understanding.

The Logical Reason. If we don't teach for understanding, then we're teaching for misunderstanding. Indeed, the average school instruction actually results in much misunderstanding, and (probably) not because of a hidden agenda. Most students don't understand the subjects they study (which is why they quickly forget them), because they lack conditions for learning that is steeped in understanding. Teaching for misunderstanding has destructive intellectual and emotional influence. Hence there is no alternative: we must teach for understanding; we must provide conditions for learning steeped in understanding.

An Educational Environment that Fosters Understanding

Here in brief are the outlines of an educational environment that provides conditions for teaching and learning steeped in understanding.
1. Teaching: Takes place in frameworks of teaching for understanding. Such frameworks were developed by Perkins and his colleagues (Wiske, 1998) Wiggins and McTighe (1998), Harpaz (2008) and others.
2. Learning: Active and inquiring learning; students ask questions and grapple with them; students create rich conceptual networks and varied understanding performances.
3. Evaluation: Performances of understanding are the standards; students are evaluated according to the number and quality of their understanding performances.
4. Curriculum: The content is organized according to the principle of depth rather than breadth; the content is organized according to "big ideas" that give meaning to the details of information.
5. Organization: The principle of providing conditions for understanding guides the organization of time and space and the hierarchy of functions.
6. Climate: The educational climate fosters wonder, the asking of questions, deep think about ideas with the aim of understanding the world and ourselves by means of them.

Conclusion

The field of teaching thinking, which is both a theoretical and a practical field, has gained momentum in the past decades and taken over considerable parts of educational discourse. It began with thinking skills, continued with thinking dispositions, and is concluding (for the moment) with the understanding. The succeeding stages of development did not do away with the earlier ones but rather displaced them from center stage and cooled off the hopes they had aroused. Teaching for understanding — the stage at which teaching thinking is now situated — doused the hopes that teaching thinking could bypass the teaching of knowledge. Nevertheless, teaching thinking does not have to return to the inculcation of rote knowledge; it must provide thinking skills, develop thinking dispositions, and enable guidance in understanding knowledge. However, because it cannot concentrate on the development of all three factors of good thinking at the same time, it would do best to concentrate on the last one — teaching for understanding.

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