Teaching and Learning in a Community of Thinking

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picture held us captive. And we could not get outside it, for it lay in our language and language seemed to repeat it to us inexorably.

(Ludwig Wittgenstein, *Philosophical Investigations*, no. 115)

Policymakers and educators in Israel, like their colleagues in the western world, are gradually realizing that traditional schooling has run its course and that trying to improve it by a policy of "more of the same" is senseless. What Edward Fiske wrote about the "factory school" in the United States is true of the factory school in Israel and elsewhere. (Paradoxically, the “factory school” is a universal aspect of our post-industrial era.)

> We must own up to the fact that anything short of fundamental structural change is futile. We are trying to use nineteenth-century institutions to prepare young people for life in the twenty-first century. American public schools grew up around an early industrial model that has outlived its usefulness in education as well as in the industry that created it. The renewal of public education in this country requires nothing less than a frontal assault on *every* aspect of schooling -- the way we run districts, organize classrooms, use time, measure achievement, assign students, relate schools to their surroundings, and hold people accountable. Trying to get more learning out of the current system is like trying to get the Pony Express to compete with telegraph by breeding faster ponies (Fiske, 1991, p. 14).

There are growing signs that the traditional “factory school” is on the verge of a radical change. Though schooling is far more tenacious than has been assumed by those who have hastened to proclaim its demise, powerful and far-reaching processes undermine its existence: new technological possibilities, demands of high-tech industries (the

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information economy), the revolution in the state of knowledge (the information explosion and the perception of knowledge as relative), the penetration of the democratic spirit into social institutions, and new and persuasive theories about the nature of learning. All of these factors create conditions congenial to a "frontal assault on *every* aspect of schooling."

This paper outlines an alternative vision for schooling, based on the “Community of Thinking” model developed at the Branco Weiss Institute for the Development of Thinking in Jerusalem. The model is currently being implemented in eighteen schools in Israel. In this article I lay out the model’s theoretical basis and then outline its practical structure and principles.

Pictures of Schooling

Traditional schooling is based on four fundamental pictures: *learning is listening; teaching is telling; knowledge is an object;* and *to be educated is to know valuable contents*. These pictures are deeply embedded in the consciousness of students, teachers and decision-makers, and are maintained daily by school structure and activity.

These basic, atomic pictures of schooling constitute school life and are constituted by it. They are not explicit, but implicit in authoritative teaching aimed at transmitting truths "as they are", and in what Seymour Sarason (1971) calls school "regularities" – the routines and norms guiding action in and outside the classroom. We ask the question: how do teachers and students "think" about schooling? Or, what pictures are in their minds or expressed in their actions as they lecture, examine, design exercises, refer to textbooks, enforce discipline and engage in other activities known collectively as “teaching” and “learning”? We argue that teachers and students engaged in these activities "think" that learning is listening, teaching is telling, knowledge is an object and being educated means knowing valuable knowledge learned in school.

The atomic pictures of schooling are revealed in our everyday language. We say, in and out of school, sentences such as: “If you don't *listen* you won't learn;” “I shall *repeat* it, so those who did not understand please *listen*;” “I want only *hard facts;*” “Her mind is *loaded*;” “This boy has an *empty* head;” “He *catches on* fast;” “She doesn't *absorb* anything;” “We must *cover* the *material*;” “My child isn’t *getting* enough mathematics.” These and other expressions reveal prevalent images about mind, thinking, knowledge, learning and teaching. They come from the world of material and static objects, and reify human consciousness and the processes involved in it.

These pictures are imbedded in western consciousness, and (possibly therefore) they appeal to our common sense (which, according to Nelson Goodman, is mostly non-sense). After all, what is learning if not listening? If one wishes to learn something, one must listen to one who knows and commit his words to memory. What is teaching if not telling – lecturing clearly and informatively? What is knowledge if not something – an object, a mass, a load – that may be transmitted through speaking? (However, this “object” has a magical property: he who transmits it does not lack it,

and sometimes transmission even increases it.) And who is educated if not one who knows (has lots of objects in his mind), one who holds in his consciousness useful and canonical knowledge – knowledge packed with truths and values that have been consecrated by time – that guides his mental and social behavior?

The atomic pictures of schooling are bound to each other and are derived from each other. Together they form the basis of the "grand picture" of schooling.

The grand picture of schooling

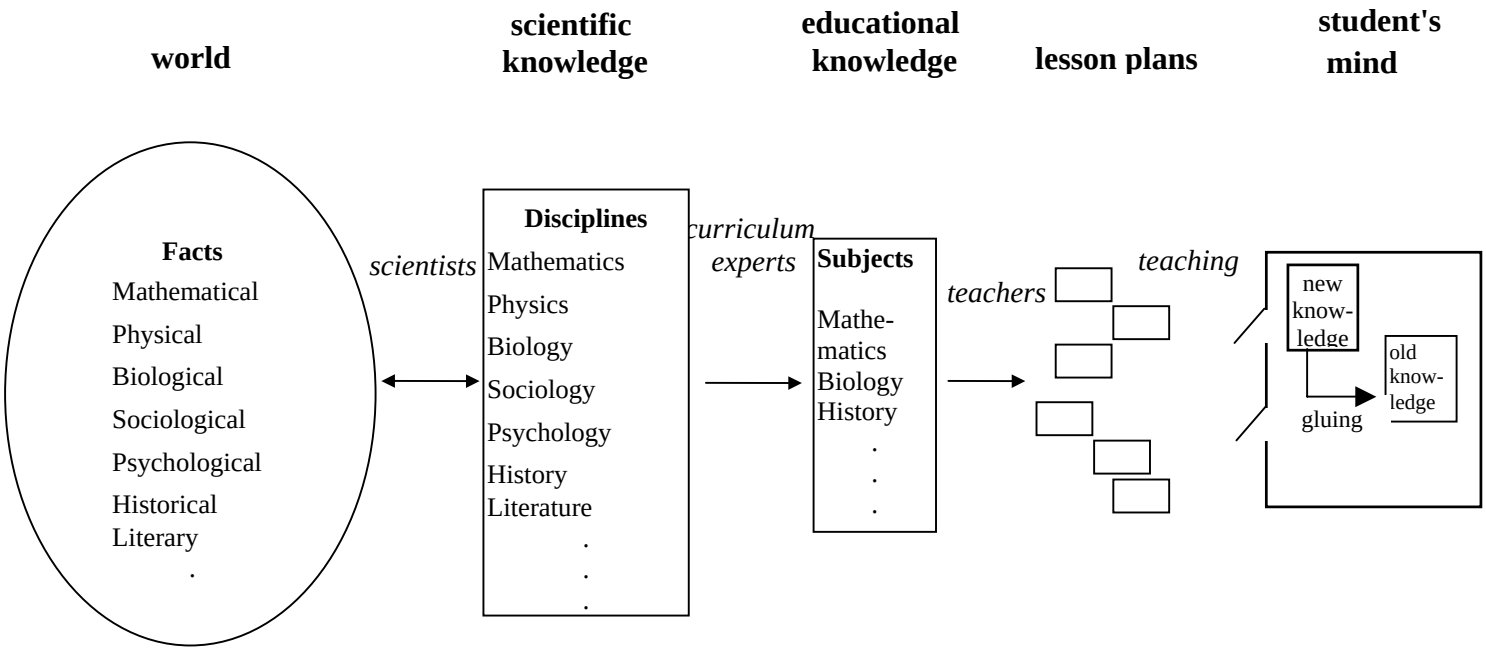
The grand picture of schooling is like a molecule composed of the four atomic pictures; but this “molecule” determines its “atoms” as it is determined by them. Like the basic pictures, it is not explicit but implicit in school activities. Its central principle is one of *imitation*. According to the principle of imitation, student learning is the last link in a mimetic chain: scientists copy the world; curriculum experts copy the sciences; teachers copy the curricula and the students copy their teachers.

This grand picture conceives of consciousness as a “mirror of nature,” to use Richard Rorty's phrase. According to it, the world is composed of facts containing inner qualities: physical facts, biological facts, mathematical facts, historical facts, sociological facts, literary facts, etc. Scientists observe the world and organize the facts into theoretical disciplines according to their qualities: facts concerning the movement of objects to physics; facts concerning organic life to biology; facts concerning the past of national groups to history; facts concerning society to sociology; facts concerning numbers to mathematics; facts concerning fictional texts to literature, etc. Curriculum designers copy from the sciences selected chapters and include them in textbooks in a well-digested version suitable for teachers and students. Teachers copy this “material” from the curricula prepared by the experts, and fashion it into lessons, which they teach to their students.

Strauss and Shiloni (1994) described this process of “transmission of material” from teachers to students in their research regarding how teachers think that children think. They describe the teachers carving the “material” into “knowledge packages” (lesson plans) which fit into the “entries” in the children's minds. In order to introduce the “knowledge packages” into the “entries," the teachers must open the "shutters" blocking them. They therefore perform several motivation-raising activities (praising, censuring, stimulating, tempting, threatening, etc.). After the “shutters” have been opened and the content has been penetrated, the teachers have the students exercise in order to “glue” the new content onto previously learned material.

This chain of imitation ends when the pupils – who have copied the teachers who have copied the curricula that have copied the sciences that have copied the world – know about the world: they have a reliable representation of it, they are adequately learned (see table 1).

Table 1: The grand picture of schooling



Beyond the traditional pictures of schooling

Learning is more than listening

Listening is an important element of learning (including listening to oneself, which is often neglected), though it is only one of many elements comprising effective learning. Furthermore, listening fostered in school is often passive and disinterested, functional listening to an all-knowing teacher in order to succeed on an examination. What is *effective learning*?

To answer that question we must pose an additional one – what is the purpose or intended product for which learning should be effective? In Dewey`s well-known terms: “It is that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases the ability to direct the course of subsequent experience." (Dewey, 1916, pp. 89-90). We interpret Dewey’s definition of effective learning’s product as *understanding*.

Though “understanding is a complex process that is itself not well understood” (Gardner, 1991, p. 179) we may define it through three components: *location*, *application*, and *performance*: To understand a concept is *to locate* it in a net of relevant conceptions (“To grasp the meaning of a thing, an event, or a situation is to see its *relations* to other things;” Dewey, 1933, p. 137), *to apply* it to new contexts, different from the one in which it was learnt (“An individual understands a concept, skill, theory, or domain of knowledge to the extent that he or she can apply it

appropriately in a new situation;" Gardner, 1999, p. 119), and *to perform* flexible, intellectual moves with it ("in a phrase, understanding is the ability to think and act flexibly with what one knows… learning for understanding is like learning a flexible performance." Perkins, 1998, p. 40). These three conceptions are interrelated – the better a concept is located the more readily it can be applied, and application is an understanding performance – and together they deepen understanding (understanding is an open, endless achievement).

What are the basic conditions for effective learning – learning that leads to understanding? Listed below are ten conditions taken from current theories about learning.

1. *Effective learning is an outcome of active construction*: Effective learning is not a result of passive absorption of contents, but of their active construction. The meanings of statements, actions or situations are the outcome of an active and creative mind – of assimilation, adaptation, interpretation, meaning making and other mechanisms of construction. (Cf. Fosnot, 1996).

2. *Effective learning results from undermining*: This essential claim is rooted in the Socratic dialogues, in John Dewey's theory of thinking and in Piaget's constructivist theory. People learn when their cognitive schemes – concepts and action patterns – are undermined by their encounter with their environment. This undermining motivates people to learn in order to restore their lost equilibrium. (cf. Steffe & Gale, 1995).

3. *Effective learning results from the "echoing" of learned content in the learner*: When content "echoes" – when the learner finds in it an answer to his vague insights, concepts and values – she tends to delve into it. This content does not reflect that which she already understands ("nothing is more repulsive than something already understood," as Nietzsche wrote), but clarifies and reorganizes her rudimentary understandings. (The second condition – the "classic" assumption of the constructivism – is rather a pessimistic view about the drive to learn. So I add this "echoing" assumption. The exsitentialist wrote about "the hunger for meaning". Lipman wrote about it's educational implications. Lipman et. al., 1980).

4. *Effective learning results from intrinsic motivation*: Good learning is the product of an interest in the topic studied and not (only) from the expectation of a reward or a fear of punishment resulting from learning or not learning it. "Task involvement" yields better learning than "ego involvement". Good learning needs both ingredients: intrinsic and extrinsic motivation, but the former must be stronger than the latter. (cf. Nicholls, 1989).

5. *Effective learning is a function of the alignment of teaching style and content to the learner's learning style and intelligences*: People learn best when instructional methods and content are adapted to their individual learning styles and intelligences. (cf. Sternberg, 1997; Gardner, 1993).

6. *Effective learning occurs in a dialogic environment*: There is an essential ingredient of dialgoue, consultation, offering and accepting support and criticism, in all good

learning. Two heads are better than one; "distributed intelligence" is better than one "closed" in the individual mind. (cf. Salomon, 1993).

7. *Effective learning entails engaging in authentic problems*: Learning is at its best when it occurs in an authentic context, in which the learner grapples with a problem that is experienced by him as "real", a problem that bothers him, that involves his life plan or identity. Learning like thinking starts with an experienced problem. (cf. Dewey, 1933; Baron, 1985).

8. *Effective learning is advanced by informative feedback*: Learning is facilitated when learners are given timely and rich information regarding their performances and achievements and how to improve them, when assessment is formative and sustaining. (cf. Perkins, 1992).

9. *Effective learning is a result of positive attitudes*: When students feel that they are accepted by their teachers and peers, and when they feel comfortable in the educational environment, they tend to invest themselves in learning. (cf. Marzano, 1992).

10. *Effective learning is the result of a productive theory of learning*: Learning is affected by the learner's implicit theories about learning. When the learner relates her learning and achievements to her efforts and not to her ability, environment or luck, her learning will be more effective. (cf. Dweck, 2000).

One could add other conditions for effective learning (e.g. effective learning is a result of freedom from coercion [Rogers, 1969]; of apprenticeship [Lave & Wenger, 1991]; of mindfulness [Langer, 1997]; of "less is more" [Sizer, 1984]; of a meaningful narrative [Postman, 1996]; of systematic mediation [Feuerstein, 1991]). The main point is that effective learning is a multi-faceted process that cannot be reduced to mere listening. Moreover, effective learning is not a neutral concept; it is a normative one. Listening obediently to authority undermines a critical and a creative attitude to oneself and the world.[1]

The conditions of learning prevalent in the "factory school" contradict all the conditions essential for effective learning: (1) Learning in school is primarily based on the passive absorption of content; (2) Teaching does not undermine basic beliefs, but often actively reinforces them; (3) Most content does not echo with students' interests and ideas; (4) Learning is primarily motivated extrinsically – rewards for good students and sanctions for bad students; (5) The contents and methods of teaching are uniform and thus inappropriate for individual intelligences and learning and thinking styles; (6) The teaching environment in the school is "monologic" – an authoritative teacher lecturing to students who work individually and often in competition with each other; (7) Learning addresses abstract, symbolic problems (e.g. "two faucets fill a pool in three hours...") rather than authentic problems; (8) Learning is not supported by formative feedback rather depressed by summative assesment; (9) School is not supportive environments; (10) Alienated learning – characterized by a lack of involvement and commitment – encourages the development of unproductive learning theories.

The concept of "effective learning" as defined above refutes the first atomic picture – to learn is to listen. Learning based mainly on listening is both ineffective and "uneducational" – it educates learners to be passive, conformist and narrow-minded.

Teaching is more than telling

Jerome Bruner (1966) contends that theories of teaching are prescriptive – they determine what is worth teaching and how. Theories of learning, on the other hand, are descriptive – they describe how a person learns. There is an unbridgeable gap between the "ought" (teaching) and the "is" (learning), and we therefore cannot derive theories of teaching from theories of learning. This claim is correct only if theories of learning are in fact descriptive only. However, we have shown above that they are also prescriptive, or normative, since they are directed – like theories of teaching – by an image of The Educated Person – the kind of person educators would like to see at the end of the educational process.[2] Thus, an inherent affinity exists between theories of teaching and theories of learning.

Teaching includes all activities and conditions that foster effective learning. When learning is considered listening, teaching – as its mirror image – is considered telling. The second atomic picture – teaching is telling – is superficial and based on our direct life experience. Someone asks: "What time is it?" and we answer: "It's five o'clock." He listened, we told, and he learned something new. But this is not a good analogy for effective learning.[3] The analogy may be true at most of teaching the most elementary information. However, when we wish to teach complex ideas, telling them is simply not enough. Instead of declaiming information, we must create the conditions for the creative criticism of ideas, or for their critical creation. Instead of declaiming knowledge, we must create conditions for effective, involved learning. (Piaget used to say to his students: "You've learned because I did not teach you," and "Each time I teach my students something, I rob them of the possibility to discover it by themselves.") When effective learning is perceived as a complicated process of construction, as having a "soft" nature not amenable to full control and planning, one must move from direct to indirect teaching.

Gary Fenstermacher and Jonas Soltis (1986) distinguished three main approaches to teaching: the executive approach, the liberationist approach and the therapist approach. In the first, the teacher is central and the aim of teaching is to provide students with defined body of knowledge and skills. In the second, the content is central and the aim of the teaching is to free the students from their limitations (prejudices, misconceptions and the like) by introducing them to this content. In the third, the student is central and the aim of the teaching is to allow him to realize himself and his dispositions. The second atomic picture – teaching is telling – fits the first approach to teahing: the executive approach. In teaching conducted by this approach, learning is based on imitating the teacher, memorizing information and exercising skills.

Teaching in a *community of thinking* (see below) does not follow a single approach. One may say that it is based on a dialectic synthesis among the three approaches. In the

community of thinking approach to teaching, individuals may develop, "realize their potential," only within certain cultural contexts, which constitute their very existence. There are no individuals, or subjects, prior to their encounter with the content of their culture; conversely, there is no culture without individuals who learn it, interpret it and give it meaning. Individuals and content are created and constructed through this meeting between them. Clifford Geertz summarizes his position about this issue in this manner:

> What this means is that culture, rather than being added on, so to speak, to a finished or virtually finished animal, was ingredient, and centrally ingredient, in the production of that animal itself… Most bluntly, it suggests that there is no such thing as human nature independent of culture… We are, in sum, incomplete or unfinished animals who complete or finish ourselves through culture… (Geertz, 1973, p. 47, 49).

A *community of thinking* is a framework for convening learners and content for the purpose of joint construction.

To conclude the discussion of this picture: William Doll argues in his book *A Post-Modern Perspective on the Curriculum* that the common method of teaching, called by Fenstermacher and Soltis "the executive approach," is based on a physical mechanistic, or "modernist" model of cause-and-effect: Teaching *causes* learning. This model gives precedence to teaching over learning. Post-modern education gives learning precedence over teaching – the latter must adapt itself to the nature of the former, thus becoming "ancillary" teaching:

> A creative paradigm has major implications for education and curriculum. First, the teaching-learning frame switches from a cause-effect one where learning is either a direct result of teaching or teaching is at least in a superior-inferior relationship with learning. The switch is to a mode where teaching becomes ancillary to learning, with learning dominant, due to the individual's self-organizational abilities. Further, in this mode teaching changes its *modus operandi*, from the didactic to the dialogic (Doll, 1993, p. 101).

In the framework of a community of thinking teaching is in fact "ancillary" to learning, giving precedence to effective student learning, and to the individual learner's "self-organization."

Knowledge is not an object

The third picture of school education – knowledge is an object – is metaphoric. He who possesses knowledge can transmit it *as if it were an object* to him who lacks it. The pattern of teaching that dominates schools – the telling instruction – embodies this picture. One of the meanings embodied in the metaphor of knowledge as "object" is that it is perceived as existing outside of and not affected or "infected" by human consciousness. Human consciousness, for its part, is not affected or "infected" by "non-rational" elements – drives, feelings, interests, socio-cultural environment, etc. Rather, it is "transparent" – an impartial medium of the world as-it-is.

This picture of knowledge and consciousness is transmitted through the teaching pattern of the schools: teachers authoritatively transmit to students "closed" knowledge packages. A short "ping pong" question and answer session takes place, manifesting the idea that every problem is well-defined, possesses a short and correct answer based on indisputable facts, and that there is someone who knows them. The students are referred to "neutral" textbooks that do not reveal the interpretative position of their authors (that is why they are so boring), and prepare for an examination that tests their ability to give uniform and predictable answers to uniform and predictable questions. The examinations are graded in precise numeric terms (an “83” indicates possession of precisely 83% of the knowledge). This process of teaching “transmits” an uncritical picture of knowledge: (a) The world is as it is – a uniform, independent existence that can be absolutely known; (b) Knowledge describes the world as it is; (c) Human consciousness is uninvolved and impartial as it mediates between the world and knowledge. This threefold picture legitimizes the teaching of all students uniform knowledge in an authoritative manner, and is the basis for the practice that has generated the modern school: one teacher instructing many students.

The most outstanding cultural project in the second half of the twentieth century – a project still incomplete – may be the undermining of the “objective” pictures of knowledge, of “transparent” consciousness, and of the uniformly describable world accompanying them (“objectivity,” according to one critical definition, “is the illusion that it is possible to conduct observations without an observer”). Kant’s “Copernican revolution” showed that “pure reason” determines the world by means of the forms of time and space and of its *a priori* categories; and Nietzsche showed that reason is not “pure” but moved by a “will for power” that is reduced into innumerable specific wills, great and capricious at the same time. Since then, it seems that thinkers and researches in all disciplines have competed to expose the “subjective” element that creates human knowledge and makes it “relative.” Philosophers, psychologists, historians, sociologists, scientists with philosophical awareness, all indicate that our knowledge is conditional, that our consciousness is actively involved in its creation and is itself conditioned by the knowledge that it creates. All unite in refuting the realistic concept of truth as the adaptation of knowledge to the world (called “correspondence” in philosophy). This concept, formerly firmly anchored in an independent world, has found itself within a few decades anchored upon “soft” foundations like “categories” (Kant), “perspectives” (Nietzsche), “language games” (Wittgenstein), “paradigms” (Kuhn), “power” and “discourse” (Foucault), “contingencies” (Rorty), and other categories – "human, all too human" – that shape not only philosophical consciousness but also common sense (we all “know” that “everything is relative”).

Such a picture of knowledge – dependent on active consciousness in circumstantial (contingent) contexts – forms a complementary picture to those of *effective learning* and *indirect teaching*. (1) If effective learning is active learning that creates its own knowledge and does not just absorb it, as is, from an external source, then knowledge and meaning are conditional and have an “arbitrary” component. (2) Indirect teaching that encourages learners to construct their learning in the framework of accepted processes of rational thinking and on the basis of dialogue with former

knowledge, with colleagues and with a professional coach, transmits through its overt and covert curriculum a more critical and current picture of human knowledge.

Knowledge, therefore, is not an object and is not a copy of the world. Knowledge is a structure or, if you will, a "story that works." Man is *homo narrativus* – a creature that tells himself stories about the world in order to endow it with order and meaning, understand it and act within it. Human knowledge is mainly a narrative that explains past events and raises expectations about those of the future. Such a picture of knowledge is a basic condition for critical and creative thinking. Children may form it through direct experience in the creation and criticism of knowledge.

One must emphasize, however, that this "story" or "structure" picture of knowledge does not lead to wild relativism. One must form, through a purposeful meta-curriculum, a complex picture of knowledge that on the one hand avoids what Rorty terms "vulgar relativism," and on the other hand what he terms "Platonism" (Rorty, 1997). The price of freedom from Platonic knowledge – knowledge as a mirror of nature – may be an epistemological and ethical nihilism of "anything goes." Therefore we must emphasize – not by preaching but by experience in the systematic creation of knowledge – that although knowledge has an unavoidable element of subjectivity, not all "stories" are good to the same degree, and some criteria (also culture-dependent) are available for differentiating between better and worse stories. A good story is one that is coherent and fits somehow the "state of affairs in the world" – possibly like a key to a keyhole and not like a mirror to its reflection (to use Ernst von Glasersfeld's alternative, pragmatic metaphor, cf. Glasersfeld, 1995). Therefore, we cannot exchange the old "seeing is believing" dogma for "believing is seeing." There are complex connections between beliefs and sights, and these complexities can be learned through well-planned, meta-disciplinary activities.

To be "educated" is not (only) to know but (mainly) to know how to relate to knowledge

The fourth atomic picture – to be educated is to know – is of major importance. It is a prescriptive rather than descriptive picture. It states the aim of education – the "product" of the educational process. Again, we derive it from what the teachers do in class: they transmit knowledge by lecturing and demand from the students to externalize it in answers to questions in the classroom, in homework exercises and in examinations, in order to check whether the knowledge transmitted was properly absorbed. Good externalizations, covering what the teacher said in the classroom or what is written in the textbooks, are rewarded. These rewards are used to motivate students to learn, and students adapt accordingly. The common externalizations in school require the recycling of knowledge, and this requires its memorization and "retention" until the time of externalization. The result of this process is what Perkins (1992) termed "fragile knowledge syndrome." Knowledge suffering from this syndrome becomes inert (inactive, useless knowledge that is not transferred to contexts other than that in which it was learned), naive (intuitive, incorrect pre-school knowledge) and ritual (used to demonstrate knowledge in school, sufficient for school

tasks but not entailing real understanding). In other words, since school knowledge is intended for externalization, it is not internalized.

The idea that the aim of education is to transmit knowledge is based on a number of dubious assumptions: that it is possible to acquire the gist of all human knowledge, that ownership of practical knowledge ensures success in life, and that ownership of canonical knowledge ensures a moral life. In an era of "information explosion," it is impossible to know the gist of all human knowledge. In circumstances in which professional knowledge changes rapidly, one must teach learners how to learn and not a closed package of skills and knowledge. Also, the ownership of canonical knowledge – containing "lofty" values – does not ensure moral behavior. In contrast to what Socrates believed, knowledge of the good does not ensure its practice.[4]

In conclusion, the fourth atomic picture – like the three preceding pictures that derive from it – is quite problematic. In this "era of knowledge," we must not glorify knowledge and impart it as if it were "large rocks," but foster a favorable, critical and creative attitude towards it. An Educated Person is not one who knows, who has many "objects" in his head, but one who knows how to relate to knowledge. She is challenged by it and is at home with it. She treats knowledge critically – passes it through an "inner locus of evaluation." She tries to reinterpret it creatively, to view it from additional perspectives and to add to it.

To conclude this critical section: Schooling is based on and guided by four basic conceptual pictures reflected in all our activities: learning is listening, teaching is telling, knowledge is an object, and to be educated is to know. We propose to replace these pictures with the following: to learn is to be involved, to be affected by the contents of learning; to teach is to create conditions for involved-effective learning; knowledge is a human structure or "a story that works"; and to be educated is to relate to knowledge in a postive, critical, and creative manner.

Schooling is captive to the four basic pictures and cannot get outside them, as they reside in school regularities, which seem to repeat the pictures to us inexorably. Only when we are free from these pictures and find/invent alternative pictures that fit the more complex and recent concepts of humanity and society, learning and teaching, knowledge and educational aims, will we be able to create environments in which more productive and humane learning can take place.

A Community of Thinking

Teacher to pupil: "What are you doing?"

Pupil to teacher: "I`m thinking."

Teacher to pupil: "Well, stop it and get on with your work."

Michael Barber, *The Learning Game*

We have been trying to develop an alternate framework for teaching and learning, on the basis of the alternate pictures. We call the proposed school model an *Intel-Lect School*,[5] and our proposed classroom model – a *Community of Thinking*. The idea of a community of thinking is not a conceptual or practical breakthrough and has no such pretenses. It offers a framework for teaching and learning whose roots are embedded in Dewey's ideas, and it branches out to contemporary concepts of teaching, learning, knowledge, the individual and society in our times.

The community of thinking is an alternative framework to that of the traditional classroom. It is a *community*, as we are dealing with a group of learners working together on a common problem by accepted means. It is a *thinking* community as its main "work" is intellectual. It may be defined as a "community of problem-solvers" – Rorty's definition for all human communities.

In a community of thinking, thinking is grasped in a strong sense, i.e., not merely as procedures of calculation and deduction or "thinking tools", but as a multi-faceted cognitive activity with social, conceptual, linguistic, emotional, motivational, physical, and other dimensions. The most important dimension in a community of thinking from the point of view of teaching and learning is the motivational dimension of thinking: The first, basic step in fostering thinking in learners is to involve them in thinking about the subject being learned, to motivate them to think, to give them courage to think by themselves ("Sapere aude! – Have courage to use your own reason!" in Kant`s famous phrase). Fostering thinking means, first and foremost, encouraging students to think with full involvement and to find the joy of thinking. "Thinking is a passionate business," said R. S. Peters.[6]

Despite Aristotle's flattering description of man as *homo sapiens*, most people do not think in this sense – i.e. base their lives on active, independent thinking. (In the same fashion, the opposite of Descartes's famous saying "I think therefore I am" is not true.) Not only does traditional schooling not give its students the chance to experience this sort of thinking, but it is constructed in such a way that they cannot experience it. A "smart school," writes Perkins, is simply a school in which the students think about that which they are learning. The main requirement of such a school is thinking for learning and for the construction of knowledge. The requirement of the traditional school, on the other hand, is first to learn and acquire knowledge and then, if at all, to think. The emphasis on involved thinking – intensive thinking about that which we are learning through that which we are learning – has far-reaching educational significance on the method of teaching and school organization.

One of the ways to abolish (partially) the alienation of school learning is to encourage the students and assist them in finding or devising their own questions, and to handling them in their own way (within rational and accepted processes of problem-solving).

The pedagogy of questioning – inventing fertile questions

On the nature and nurture of questioning

Questioning – the activity of creating questions – is a human trait *par excellence*. Man has been called by Aristotle *homo sapiens* (thinking man); by Marx *homo faber* (producing man); by Huizinga *homo ludens* (playing man); and *homo narrativus* – by post-modernists. In addition to all of these, man is also a *homo quaerus* – a questioning man, incessantly asking questions in his quest to understand himself and the world around him.

This human trait – the ability and the inclination to ask questions – has some basic, paradoxical characteristics of practical educational significance. Four such characteristics are:

Questioning is a creative activity: Contrary to popular belief that questioning is a valueless, sometimes annoying characteristic that does not attest to any impressive personal quality, questioning is by nature a creative activity – maybe even the epitome of human creativity. Questions are human inventions that do not exist in the world like other objects – stones, houses or people. Objects do not appear in the world together with questions about them; on the contrary, they appear as whole and complete. The ability to ask questions is the ability to go "beyond the reality given," beyond what is directly present. The present object is grasped as lacking, enigmatic, maybe even mysterious. The lack, enigma and mystery are not experienced on the same level as the object itself, but transcend it and overshadow it. That which is *not* pushes that which *is* to the outskirts of consciousness, itself appearing at its center, capable of explaining that which is. The ability to see that which *is* – the whole in itself – as lacking (to create nothing from something) is the ability to transcend the given by means of imagination, toward that which will complete and explain it: missing facts, physical reasons and human purposes. The question "Why did the child laugh in his dream?" for example, transcends the given – the child's laughter – toward unknown (and unconscious) reasons that may explain the laughter. The asking consciousness removes itself from the present laughter toward the reasons for the laughter that are absent – from that which *is* to that which is *not* that may explain it.

Questioning is a special elaboration of previous knowledge: According to popular belief in school teaching, those who do not know have questions. Questions indicate lack of understanding, ignorance, weakness of mind or of character, and sometimes even ill will – a will to bother the teacher and disturb the flow of his lesson, to expose his ignorance, to trip him up. Questions therefore have a dubious status in society and especially at school. Clever students have answers; lazy students have questions (they did not listen to the teacher, were absent from class, did not do their homework, etc.). This belief about questioning as based on "absences" (of the person himself or of his attention), justified or unjustified, is generalized to all questions. However, good questions do not indicate "absences," rather they reveal a strong presence – involvement in the subject and deep understanding of it. These questions are of a different quality, indicating an active, critical and creative attitude toward the

information imparted. Such questions require better understanding of previous knowledge. They reflect a very advanced "understanding performance" – mental activity through knowledge about knowledge. The questioner is thus not ignorant but rather quite knowledgable.

Questioning simultaneously blocks motivation and awakens it: Contrary to popular belief that people tend to ask about the nature and character of phenomena in the world – to wonder about them – people do not tend to ask such "big" questions (although they are able to do so, and this ability sets them apart). If such questioning were to be interpreted in terms of constructivist theory, it would indicate that the schemes by which we explain world phenomena have been undermined. This undermining entails loss of the cognitive equilibrium to which we aspire – a state in which we can incorporate our experiences in our own schemes without difficulty. This loss of equilibrium creates distress, and people normally tend to avoid distress. Moreover, questioning may entail a change in our own schemes, and this too is a somewhat painful process. When, however, questioning has been accomplished and is authentic, it may be a great source of energy for investigation. Striving for renewed equilibrium, for an acceptable answer or solution, motivates human learning. Thus, the very factor that prevents questioning – striving for equilibrium – also encourages a struggle with questions and powerful learning.

Questioning fashions the answer: Contrary to common belief that there is an absolute gap between question and answer – the question is known and the answer to it is completely unknown and its possibilities are open-ended – the answer is vaguely imbedded in the question itself. The concepts of the question and the suppositions concealed in them shape the conceptual framework of the answer. For example, when I ask in a daily context, "Where does Mark live?" the question dictates to a large extent the answer I'll receive, and also what will be considered an appropriate answer. The question presupposes that people live in apartments, these have addresses that enable finding those who live in them, etc. An appropriate answer would be, "Mark lives on 7 Wisdom Street, apartment A." An inappropriate answer in the context in which the question was asked would be, "Man (or Mark) lives within himself." Moreover, the concepts of the question fashion the suppositions – answers that have not yet been confirmed – that daily or academic research wishes to examine. The question is therefore not only an expression of a deep understanding of previous knowledge, but also determines what will be considered knowledge: suppositions that have been confirmed.

Questioning therefore involves an ability to transcend given information, an understanding of knowledge, mental willingness to undermine existing knowledge structures and to indulge in the construction of new structures and knowledge. These conditions for questioning point to the major importance of questioning in the creation of human knowledge and the difficulties involved in it. Educational conditions enabling and encouraging questioning require a fundamental change in the educational environment.

Teaching focussed on questioning rather than on the ability to produce "correct answers" must adapt itself to the basic characteristics of questioning and all that derives from them. It must (a) create an educational atmosphere that enables and encourages creativity through respect for the autonomy of the learners, i.e. for their questions; (b) present knowledge in such a way that will stimulate questions; (c) undermine the cognitive constructs of the learners, so as to motivate learning; (d) bind knowledge to questioning, so as to show how each piece of knowledge is conceptually (as well as motivationally) determined by the questioning which preceded it.

In the school context, the pedagogy of questioning encounters another difficulty, specific to the school situation: during the lengthy learning period spent in school, the students develop a strong survival instinct that directs them to minimal investment in learning. School adds to laziness an alienated, externalized and poorly invested learning, deriving from the need to survive in an unreasonable, demanding environment. This "school instinct" prevents students from becoming involved in authentic questioning, which may drag them into energy-consuming involvement in a school subject. The framework of a community of thinking attempts to overcome this and other difficulties connected with the pedagogy of questioning by creating an environment encouraging questioning and rewarding it. It tries to create a true "questioning distress" (an undermined situation) that will motivate meaningful learning – involved and deep inquiry.

A fertile question

The pedagogy of questioning places the question at the center of teaching and learning. It deflects teaching from its focus on a "correct answer" to a focus on "a fertile question." The first stage of teaching and learning in a community of thinking is finding or inventing a fertile question. What is a fertile question? We have defined it as a question having six basic characteristics:

(a) *An open question*: a question that *in principle* does not have one definite answer, but actually several answers different from and even contradictory to each other.

(b) *An undermining question*: A question that undermines the basic assumptions and fixed beliefs of the learners; one that casts doubt on the "self-evident," on "common sense;" uncovers basic conflicts lacking a simple solution, and requires thinking about the roots of things.

(c) *A rich question*: A question that requires grappling with rich content indispensable to understanding man and the world; that is impossible to answer without careful and lengthy research; that tends to break up into sub-questions.

(d) *A connected question*: A question relevant to the life of the learners, to the society in which they live, and to the discipline and subject within which it was asked.

(e) *A charged question*: A question having an ethical dimension. Such questions have a strong emotional and ethical charge able to motivate learning and inquiry.

(f) *A practical question*: A question that can be developed into a research question; a question about which information is available to students.

Table 2: Examples of fertile questions asked in Communities of Thinking

The Human Genome Project – a curse or a blessing? (biology)
Why do we sleep? (biology)
Human beings – a product of environment or genetics? (biology)
Why is the sky blue? (physics)
Is Jerusalem really united? (geography)
Is there a geographic entity called "the Middle East"? (geography)
Is it possible to establish a "New Middle East"? (geography)
When was life better – in the Middle Ages or today?" (history)
Why did the farming class obey the gentry and the church, although these exploited and oppressed it? (history)
How did it happen that the same generation that called the First World War "The war to end all wars" initiated the Second World War within two decades? (history)
Is Israel on the verge of a civil war? (history)
Is there progress in history? – The case of the 19th century" (history)
Our Independence Day is the Palestinian *Anakba* [catastrophe] – Was this an inevitible process? (history)
What makes a "good story"? (literature)
Who is "the other"? (sociology-anthropology)
Why do people marry? (sociology-anthropology)
What is love? (from a sociological point of view)
What is love? (from a biological point of view)
What is love? (from the point of view of certain literary works)
"How should Israel develop in the next fifty years?" (multi-disciplinary)

Teacher-coaches in a community of thinking suggest to the learners a fertile question (one meeting the above criteria), in *the framework of the discipline* they teach. A fertile question transcends any one discipline, but must be dealt with within a discipline – although not exactly in the normal disciplinary framework.

Teaching in a pedagogical discipline

Teaching in a *community of thinking* aims to foster disciplinary thinking, because (1) Disciplines are the best tools available to man for understanding himself and the world, for organizing his knowledge, for disciplining his thinking, for criticizing existing knowledge and for producing new knowledge; (2) The theoretical disciplines enable us to understand the "deep structure of the world," i.e., to transcend our direct experience, our intuitions, and to understand natural and human phenomena in a deeper, more

abstract way. (“The world,” writes Perkins, “does not wear its deep structure on its sleeve”); (3) The occupation with disciplines values knowledge created through them, and does not give up knowledge for the sake of process or of general thinking skills. Disciplinary knowledge is itself an important thinking tool.

Yet, we do not propose to organize knowledge for the purpose of school teaching in the framework of research disciplines. We would like to propose instead a new concept – *a pedagogical discipline*. In the lively discussion between those supporting disciplinary teaching and learning and those who advocate inter-disciplinary teaching and learning, both camps wrongly assume that schools teach disciplines. The “conservative” camp wishes to continue doing so, and the “progressive” camp advocates various combinations of disciplines. As a matter of fact, schools teach *subjects* and not disciplines. The subject is a unique school creation, different from the theoretical, academic research discipline in several essential aspects: (1) *Aim*: The aim of the subject is to impart existing knowledge, whereas the aim of a discipline is to create new knowledge; (2) *The nature of the questions*: The questions asked in teaching a subject are closed, whereas the questions asked in the framework of a discipline are open, “scientific puzzles;” (3) *Approach to knowledge in the field*: In teaching subjects, the emphasis is on accepted knowledge; whereas in disciplinary research the emphasis is on controversies and dissent within the paradigm; (4) *Quality of thinking*: Thinking fostered by teaching a subject is pre-disciplinary and static, whereas the thinking fostered in disciplinary research is thinking from a narrow disciplinary perspective; (5) *Sources of information*: The sources of information in teaching a subject are usually school sources, mainly textbooks and the teacher's words; while research has at its disposal primary sources – observations, laboratory experiments, historical documents and the like; (6) *The number of realms handled*: The number of subjects learned in school is about ten; a researcher is involved with one discipline only, occasionally “digressing” to related ones.

These differences suffice to illustrate the essential difference between a research discipline and a school subject. Yet one must not conclude from this distinction that the school should change from teaching subjects to teaching disciplines. The role of the school is not necessarily to produce able researchers. We therefore suggest replacing the subject with the “pedagogical discipline.”

This concept aims at organizing human knowledge for an “internal” educational purpose – developing the learners' ability to think in an involved, skillful way, on the basis of knowledge. Taking the aspects we mentioned above, (1) *The aim* of the pedagogical discipline is to develop thinking by dealing with productive and organized knowledge; to understand through the perspective of a given discipline without necessarily researching in it; (2) *The nature of the questions* asked in this framework is described by the term "fertile question" (see above); (3) *The apporach to knowledge* in the field stresses the central ideas and controversies of the discipline; (4) *The quality of thinking* it fosters is systematic and multi-faceted (derived from involvement in several communities of thinking and active engagement in meta-disciplines -- “higher order knowledge"); (5) *The sources of information* feeding it are various and depend on the interests of the learners (see below, description of research); (6) *The number of*

knowledge areas in which the learners are simultaneously deeply engaged depends on their ability to do so, and is usually about three.

The fertile question asked, therefore, in the framework of a pedagogical discipline is the "field" on which the community of thinking "plays." The question itself usually transcends a discipline, but is handled from the perspective of a given discipline.[7] In a community of thinking, the theoretical disciplines are not dispossessed in favor of pre-disciplinary ones posing as inter-disciplinary in the name of "real life" (which, as we know, is "inter-disciplinary"). A community of thinking strives (1) to create a real connection between "life" and disciplines, and (2) to turn disciplines into "life" – i.e., to autonomic realms of meaning. However, when disciplines – organized realms of knowledge having typical objects of research, research and verification procedures and basic concepts – are learned in school, they need to be adapted to the "true" aim of education: fostering the abilities of young people and rendering their lives richer and more meaningful. This means that we must turn the pedagogical disciplines into means for further development – which is, according to Dewey, the true aim of education.

Back to the fertile question

In a community of thinking, the fertile question is Archimedes' fulcrum of teaching and learning. It is not a given, and must be invented (in novice communities of thinking, the teacher poses it; in expert ones, the students are drawn into the process). The leap from level 1 (Table 3 below), typifying teaching and learning in school, to level 4, typifying teaching and learning in a community of thinking, is a major one, and entails many difficulties during the initial period (lasting one or two years or more). Just as one cannot expect a smooth and painless passage from playing in a fire brigade band for a long time to playing in a jazz band, so one cannot expect a smooth passage from a normal classroom framework to a community of thinking.

Table 3: From a given problem and solution to a non-given problem and solution

	Problem	**Means**	**Solutions**
Level 1	given	given	given
Level 2	given	given	to be found
Level 3	given	to be found	to be found
Level 4	to be found	to be found	to be found

Initiation

Questions arise from initial, vague answers to them. This means that previous knowledge is needed in order to ask a good, fertile question. Therefore, *initiation* into

disciplinary knowledge is conducted alongside the process of finding or inventing the fertile question, and facilitates it. This initiation is conducted through various teaching methods – lectures, supervised text reading, cooperative learning, peer teaching etc. – and focuses on questions through: (a) connecting the knowledge to the questions that created it (the "archaeology of knowledge"); (b) focusing attention on questions raised by answers to original questions (every solution creates additional problems); (c) creating a *question bank*: a collection of questions around which research may be conducted. The process of initiation – forming the common knowledge basis necessary for creating questions and conducting research – continues throughout the process of learning and teaching in the community of thinking: initiation while questioning, while researching and while preparing the concluding performance.

The pedagogy of inquiry – treating questions systematically

The second stage in teaching and learning in a community of thinking is research. After the community has chosen a fertile question, it divides into small research teams that choose research questions – sub-questions of the fertile question. We recall that one of the traits of a fertile question is its *richness* – its ability to be broken up into (or spawn) many sub-questions. The research teams examine sub-questions, which are aspects of the fertile question, together composing comprehensive research of it.

A good research question must be: (a) *interesting* – to students, and possibly also "objectively;" (b) *open* – requiring that the researcher take a position and not only report facts; (c) *rich* – requiring deep and lengthy research; (d) *connected* – to the main fertile question and to the domain of knowledge; (e) *practical* – can be turned into a focused research question having available relevant material. Research teams must show how the sub-question they've invented adheres to these criteria.

Elaborating the crude question into a successful research question is the task of the teacher-coaches together with the community of learners. The learners often raise vague questions, questions based on faulty conceptual understanding or questions that do not really interest them. The adult coaches must spend time with each team to thoroughly elaborate the problem, mobilizing the whole community in this task.

Learning in a community of thinking is based on cycles of teamwork and whole class discussions and lessons. The plenum is mobilized at various stages to aid the research teams. One such stage is the discussion of the research questions of the teams. The teams present their questions, and the community plenary session examines them according to the agreed criteria, and suggests improvements or alternative questions. The stage of elaborating the question is a critical one, determining the fate of the research that will follow.

Molding the question for research purposes

After the research questions have been approved by the coach and learners, the research teams begin the research itself using an *agreed method*. This includes a

general component and a discipline-dependent component, as well as *pre-research* directions for the *research itself*. An example of pre-research directions is:

1. Formulate your research question.
2. Try to raise preliminary thoughts or hypotheses to answer the research question.
3. Break the research question into sub-questions.
4. Specify possible and available information sources.
5. Define your research tools.
6. Present a preliminary research proposal.
7. Make a preliminary decision about the concluding performance.
8. Set a timetable and formulate short-term and long-term tasks; allot the work among the members according to interest and ability.
9. Examine your research question once again: is it interesting, open, connected, practical?
10. Prepare a list of essential and practical questions to ask the coach in order to receive guidance for further work.

As stated, this general method contains a discipline-dependent component. The questions, hypotheses, information sources, tasks, the concluding performance, the research tools, the rules of verification – all are dependent to some degree on a given realm of knowledge. Guidance about the research itself is even more dependent on the nature of the discipline in which the research question is asked.

In the course of research, the learners are allowed and even encouraged to exit the school in search of information. One of the key terms in a community of thinking is *the world as a text*: the learners learn to see in the world – in people, industrial centers, shopping and recreation centers, films, exhibitions, and of course in the Internet, libraries and scientific institutions – an inexhaustible source of information relevant to the question on hand, as well as a setting for various points of view and interpretations.

After formulation of the research question, and submission and approval of the research plan, the teams start research with the aim of answering the question according to their research plan. This is a difficult stage to manage. The teacher-coaches must orchestrate a whole class of teams who are autonomous, yet lacking in experience and discipline. The educational effectiveness of this stage, and of the community of thinking as a whole, depends to a large extent on the ability of the teacher-coaches to reach each research team and guide it. Original solutions must be found to increase the working time of the coach with teams, such as working with research groups after school hours, introducing adult coaches from outside (parents, university students or retired people with appropriate skills), training older students to guide younger ones, etc.

Work in plenary sessions continues alongside the research work of the teams. It is used for *initiation* – imparting knowledge and skills for thinking, research and team

work – as well as for *reciprocal teaching* – research teams who have formed a "first draft" of their research and present it for feedback to the community plenary session. The cyclic character of work in research teams – meeting in plenary sessions, teamwork, plenary sessions and so on – epitomizes the dynamics of working in a community of thinking. Its role is to place each group's research in the overall picture created by the whole community.

The research takes place in the manner of "creation of knowledge" within the discipline in whose framework the teams are working. However, the aim of the pedagogy of research is not to train young professional academics – mathematicians, biologists, historians, literary critics etc. – but to expose the learners to "realms of meaning" and to teach them to think systematically, to plan, organize, cooperate, listen, discuss, initiate, create, criticize and understand. Therefore, linkage to the disciplinary research method is subject to pedagogical considerations focusing on the growth of the learner.

The pedagogy of the concluding performance – putting knowledge to use

The third stage in a community of thinking – the *concluding performance* – encourages the learners to *do* something with their knowledge: to "play" it, to operate it. The operation of knowledge – its creation, criticism, analysis, composition, application, reinterpretation, presentation – is not only a manifestation of its *understanding*, but also the means to understanding's *construction*.

The concluding performance stage replaces the traditional, pencil-and-paper examination, which suppresses creative work on knowledge by expecting from the examinee to recycle knowledge in an exact way. The traditional examination is the "lowest pick" of previous learning, as the learning had (possibly) included cognitive activities more sophisticated than memorizing information. Examination is suited to students having certain compositions of intelligences and thinking and learning styles, and harms those who lack them. It entails test-anxieties that paralyze thinking and make learning loathsome. The *concluding performance*, on the other hand, encourages creative activity upon and through knowledge, and is a direct continuation of the preceding learning by research. It is suited to various learner abilities and affinities, and entails the joy of creation that endears learning to learners.

The concluding performances include a team performance (by the research teams) and a communal performance (by the whole community of thinking). The latter presents a comprehensive view, of all research teams, of the issue under study, and represents the community's "answer" to the fertile question.

The nature of the concluding performances, both team and community, depends on the preferences of the researcher-learners or, to use Howard Gardner's words, on the profile of their intelligences. Those with a strong linguistic intelligence emphasize writing in the expression of their research. Those with strong spatial intelligences emphasize expression through art, etc. It is therefore possible to render the performance and to reflect the thinking invested in it through various media – a written

study, a symposium, a newspaper, a presentation, a film, a mock trial of a historic character or period, etc. The pattern that has been established in schools applying the idea of a thinking community is that of a written team research paper, together with an illustration relevant to the realm of studies (building a model of a church or a castle, drawing an ancient map, composing a tune, preparing a presentation, demonstrating an experiment, writing a letter to an influential person in a certain area, preparing and applying a curriculum, producing a school event, preparing a plan for the conservation of city sites, producing a newspaper, etc.). These must conform to high standards in the medium in which they are rendered.

The possibility to express learning and its achievements in a medium of expression of one's choice is a strong motivational factor typical of the stage of concluding performance. Remember that the community of thinking focuses on the *rehabilitation of learner motivation*, on their involvement in the process of learning. An element of motivation is present in each of its stages – fertile question, research and concluding performance (see Table 4). In *the fertile question stage*, the undermining nature of the question is intended to create motivation – an effort to restore the lost equilibrium. In the *research stage*, focused research is intended to involve learners in the topic under study, to cause intellectual and emotional "investment" and to arouse intrinsic motivation. In this stage, a process like Freud's "cathexis" should take place – charging the object with "libidinal energy" or, more simply stated, its becoming attractive through the investment of "the self" in it. In addition, interest tends to multiply by awakening further interest. (An educational theorist once remarked, "Children are different from bottles – full children fill up more quickly."). In the *concluding performance stage*, the possibility to express oneself by means of a medium of one's choice, to see a finished product and to *exhibit* it to others arouses motivation.

Table 4: Components of internal motivation in the three teaching and learning stages in a community of thinking

Stage	**Foci of motivation**
The fertile question	Undermining accepted knowledge and beliefs, which thereby motivates learning through a desire to restore equilibrium
The research	Investing the "the self" in the research topic (cathexis); gaining interest
The concluding performance	Self expression by means of a medium of choice; pride in a finished product; presentation

The concluding performances are rewarded with *generative feedback* by the teacher-coaches and the learners themselves. The aim of this feedback is not grading but advancing development. Feedback is based on pre-ordained criteria, often designed cooperatively by the learners and their teacher-coaches. Feedback begins from the outset of learning and research and continues until the conclusion of the community of thinking. Feedback is characterized by dialogue between the learners and those facilitating their learning. This dialogue occurs in many different settings, including small group consultations, written responses, plenary presentations and discussions and joint peer feedback meetings.

Understanding performances

John Holt wrote in the classic *How Children Fail* (1964):

> It may help to have a picture in our minds of what we mean by understanding. I feel that I understand something if and when I can *do* some, at least, of the following: (1) state it in my own words; (2) give examples of it; (3) recognize it in various guises and circumstances; (4) see connections between it and other facts or ideas; (5) make use of it in various ways; (6) foresee some of its consequences; (7) state its opposite or converse. The list is only a beginning; but it may help us in the future to find out what our students really know as opposed to what they can give the appearance of knowing, their *real learning* as opposed to their *apparent learning* (Holt, 1964, pp. 136-137).

A team of experts at Harvard's Graduate School of Education and Project Zero has developed this concept of understanding, and called it “understanding performances” (Wiske, 1998). This concept complements the concept of understanding as a representation – a reflection in consciousness of the state of affairs in the world. It defines mental performances with knowledge about knowledge as manifestations of understanding. This is a productive concept from an educational point of view, as it extracts understanding as an internalized representation from its mystery and passivity, and turns it into something “public” that may be seen and fostered – understanding performances that one may define, discover, give feedback to, and thereby foster.

This concept is vital to the stage of concluding performance – both for the performance and its assessment. (Similarly, the concept is employed in the previous initiation and research activities.) The understanding performances (see Table 5) are used as central criteria for the concluding performances of teams and community alike, and for their assessment by the learners, coaches and outside experts.

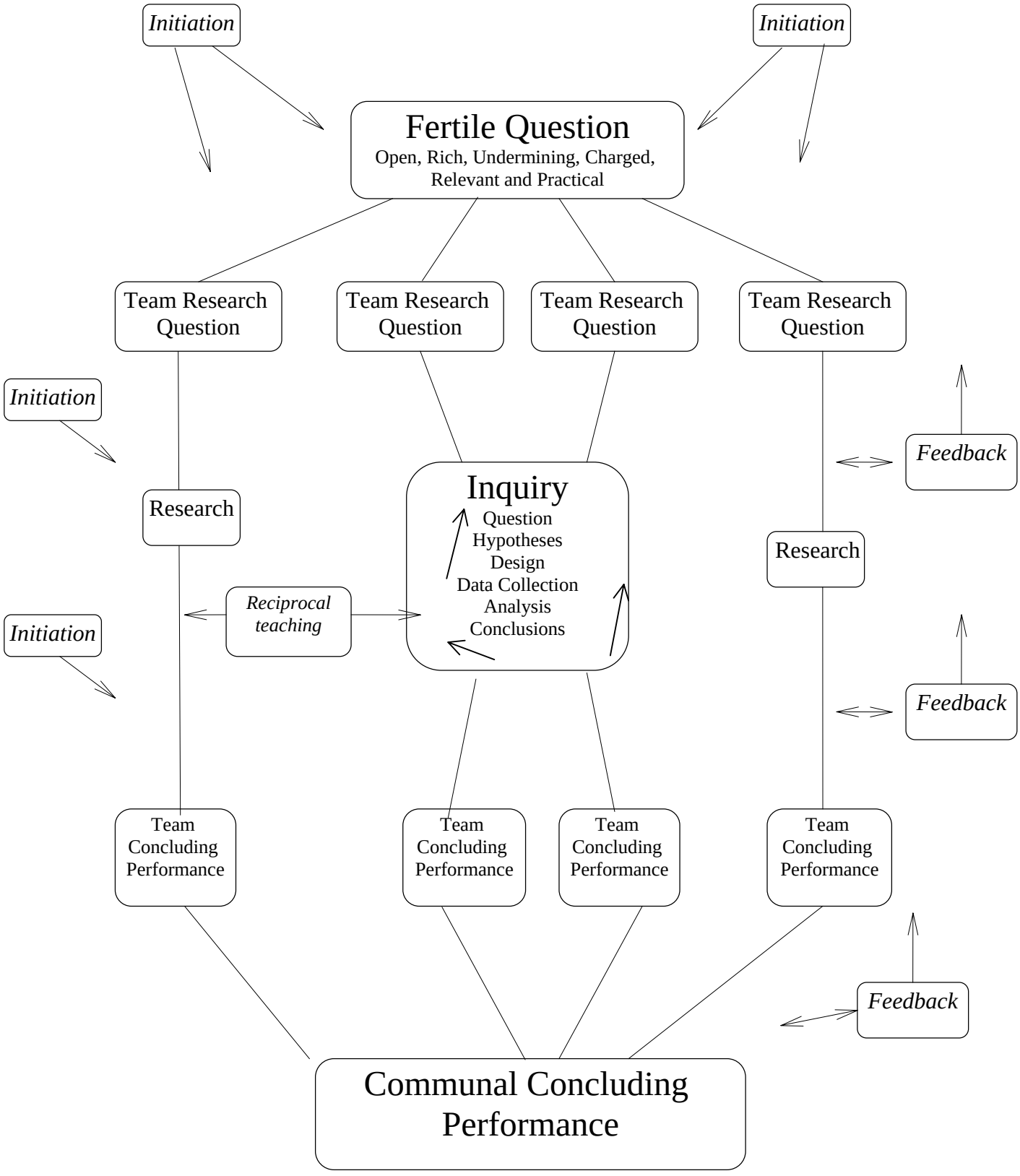
Table 5: Types of understanding performances

1. To express knowledge in your own words
2. To bring examples of knowledge
3. To generalize from an item of knowledge
4. To identify knowledge in different contexts
5. To place knowledge in context
6. To explain phenomena by the use of knowledge
7. To give arguments for knowledge
8. To justify, to give evidence for knowledge
9. To compare cases, phenomena, claims
10. To transfer knowledge from one domain to another, to life experience
11. To discover contradictions and tensions in knowledge
12. To formulate knowledge that contradicts knowledge (or claims)
13. To foresee possible results of knowledge
14. To break knowledge into its components (analysis)
15. To unite components of knowledge (synthesis)
16. To criticize knowledge on the basis of knowledge
17. To create knowledge on the basis of knowledge
18. To identify basic hypotheses of knowledge
19. To create a simulation or metaphor
20. To create a model
21. To present knowledge
22. To ask a question

Et cetera...

In conclusion, one may describe the process of teaching and learning in a community of thinking using the following scheme (Table 6):

Table 6: Flowchart of a community of thinking



Final comment

School is a coherent system, and therefore significant, second-order change must affect not only the classroom but also the whole school. In other words, meaningful change of teaching and learning in school must be performed on two main axes: the teaching method – since in teaching the medium is the message: the pattern of instruction is the (real) content of instruction (cf. Postman & Weingartner 1969); and the school's organizational structure. We aim to change the teaching method in school into that of a *community of thinking*, and the general organizational structure of the school into a structure of an *Intel-Lect school* (or "home for the mind" – to use Costa's phrase; 1991) The outlines of the structural change will be described in a separate article.

Of course, the school is not the final step. Just as change of classroom practices necessitates reforming the school as an organizational unit, the latter requires change of the entire structure of the Israeli school system. It can also be argued that change of the educational system necessitates far-reaching social change. We, in any event, advocate a strategy of "thinking big and acting small".

For the past seven years, over a dozen primary and secondary Israeli schools have been realizing – each in its own way – the *community of thinking* model. A survey of these efforts, an analysis of the problems they encounter – predictable and unpredictable – and some proposed solutions are the matter for another paper. The problems are immense, but here and there we see signs of effective learning and the growth of effective thinkers and learners. We believe that, with much effort and patience, these signs may grow into full-fledged pictures, which will "captivate" learners, teachers, administrators, schools and even the entire educational system.

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Notes

[1] This point is at the root of the "wondrous" agreement between the aims of education as formulated by philosophers and the arguments of psychologists about the nature of effective learning.
[2] Kieran Egan claims that this image is the projection of the ideal self of the educators (Egan, 1999).
[3] In this case, the man who asked had an interest in knowing the time. Children in school don't ask, and have little to no interest in knowing the contents told to them. That's why we add repetitions, exercises and tests.
[4] Furthermore, even if these dubious assumptions are right, we must still remember that school imparts knowledge in such an inefficient way that all assertions in praise of its acquisition are largely irrelevant. See the above discussion of fragile knowledge syndrome. Education aimed at transmission of knowledge (as opposed to that aimed at fostering thinking) fails on its "home turf".
[5] *Intel Electronics* of Israel supported the development and initial implementation of the model.
[6] We may distinguish between "thinking dispositions" and the "disposition to think". We are talking here about the latter – the readiness to plunge into thinking when appropriate.
[7] The question "What is love?" was asked in one school in three different disciplines – sociology, biology and literature. Students who experience handling this question from different disciplinary angles are experiencing disciplines as "ways of world-making", to use Nelson Goodman's expression.