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Teaching and Learning in a Community of Thinking

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ABSTRACT: The article develops a theory and practice for teaching and learning in a Community of Thinking. According to the theory, the practice of traditional schooling is based on four "atomic pictures": learning is listening; teaching is telling; knowledge is an object; and to be educated is to know valuable content. To change this practice of schooling, educators must replace these pictures in their consciousness. One possible alternative is the Community of Thinking, a framework based on three stages: fertile question, research, and a concluding performance. These stages are supported by a continual process of initiation by which students form the common knowledge base necessary for creating questions and conducting research. Developed in Jerusalem by educators at the Branco Weiss Institute for the Development of Thinking, this framework is currently being implemented in 18 schools in Israel.

> *A 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, gradually are realizing that traditional schooling has run its course, that trying to improve by doing "more of the same" is senseless. Indeed, a number of signs point to radical change in the traditional "factory school." Although 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. Among these are new technologies, demands of high-tech industries (the information economy), the revolution in the state of knowledge (the information explosion, the easy access to information, 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 effective learning and teaching. Each of these factors creates conditions congenial to a "frontal assault on every aspect of schooling."[1] One alternative vision for schooling, based on the Community of Thinking model developed in Jerusalem at the Branco Weiss Institute for the Development of Thinking, currently is being implemented in 18 schools in Israel and 1 school in Australia.

Pictures of Schooling

Traditional schooling is based on four fundamental, or "atomic," pictures: learning is listening; teaching is telling; knowledge is an object; and to be educated is to know valuable content. These pictures are deeply embedded in the consciousness of students, teachers, and decision makers, and they 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 always explicit, but are implicit in authoritative teaching aimed at transmitting truths "as they are" and in what Sarason has called school "regularities"—the routines and norms guiding action in and outside the classroom.[2] We ask the question: What kind of pictures are in the teachers' 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"? Teachers who engage in these activities "think" that learning is listening, teaching is telling, knowledge is an object, and being educated means knowing the knowledge learned in school.

The atomic pictures of schooling are revealed in everyday language, in sentences such as these: "I shall repeat it, so those who did not understand, please listen" or "This boy has an empty head" or "She doesn't absorb anything" or "There is lots of material to cover" or "My child isn't getting enough mathematics." The pictures are imbedded in Western conciousness, and, therefore, they appeal to our common sense. 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 is like a molecule composed of the four atomic pictures. Like the atomic pictures, it is more implicit than explicit in school activities. Its central principle is 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 students copy their teachers.

This grand picture conceives of consciousness as a "mirror of nature": the world is composed of facts containing inner qualities (such as physical facts and historical facts). Scientists observe the world and organize the facts into theoretical disciplines according to their qualities. For example, facts concerning the movement of objects are organized into the discipline of physics; facts concerning the past of national groups are organized into history. 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 Shilony describe this process of "transmission of material" from teachers to students in their research regarding how teachers think that children think.[3] They note that teachers carve the "material" into "knowledge packages" (lesson plans) that fit into the "entries" in the children's minds. To introduce the knowledge packages into the entries, the teachers must open the "shutters" that block them. They therefore perform several motivation-raising activities, such as praising, censuring, stimulating, tempting, and threatening. After the

shutters are open and the content has penetrated, teachers require students to complete exercises in order to "glue" the new content onto previously learned material.

This chain of imitation ends when students—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 adequately have learned. Figure 1 portrays this traditional notion of schooling.

Figure 1. The Grand Picture of Schooling

Beyond the Traditional Pictures of Schooling

Learning Is More Than Listening

Though important, listening is only one of many elements that constitute effective learning. Furthermore, listening as fostered in school is often passive and disinterested; it is "functional" listening to an all-knowing teacher in order to succeed on an examination.

What, then, is effective learning? This model defines "effective learning" in terms of involvement in its process and understanding of its product.

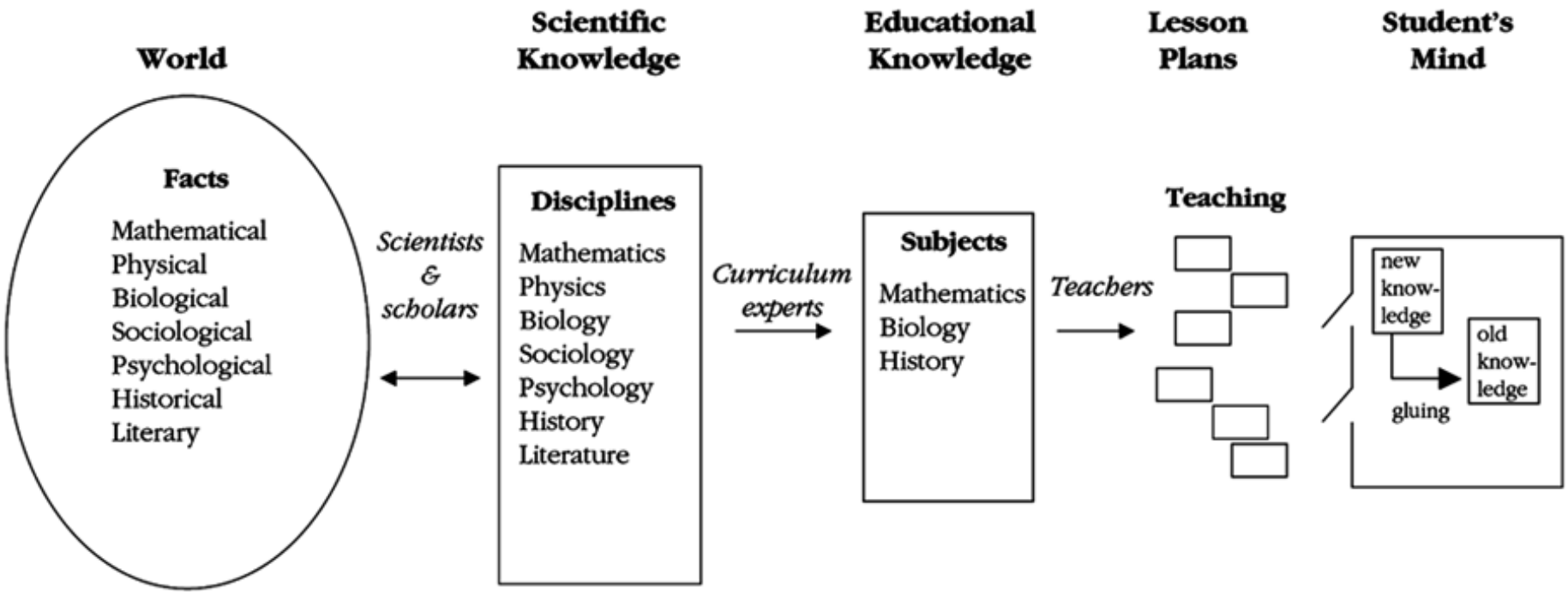
Nicholls identifies two kinds of involvement: "ego involvement," in which people care about themselves, and "task involvement," in which they care about the task at hand.[4] Task involvement at its most intensive is a state of unity between the subject who learns and the object that is learned. Csikszentmihalyi calls this state "flow."[5] The Community of Thinking cultivates task-involvement state of mind.

"Understanding is a complex process that is itself not well understood."[6] It has three components: location, application, and performance. To understand a concept is to locate it in a net of relevant conceptions (or, as Dewey says, "to grasp the meaning of a thing, an event, or a situation is to see its relations to other things"[7]); to apply it to new contexts, different from the one in which it was learned (or, as Gardner says, "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"[8]); and to perform flexible, intellectual moves with it (or, as Perkins says, "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."[9]). These three conceptions are interrelated. The third one—the performance aspect of understanding—is most useful from a pedagogical point of view, and it directs the teaching and learning in the Community of Thinking.

Ten conditions for effective learning gleaned from current theories are important to consider.

1. *Effective learning is an outcome of active construction*. It 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.[10]

Figure 1. The Grand Picture of Schooling



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.[11]
3. *Effective learning results from the "echoing" of learned content in the learner*. When content "echoes"—when learners find in it an answer to their vague insights, concepts, and values—they tend to delve into it. This content does not reflect what they already know, but clarifies and reorganizes their rudimentary understandings. (The second condition—the "classic" assumption of constructivism—is a rather pessimistic view about the drive to learn. Therefore, this "echoing" assumption adds power. Existentialist philosophers wrote about "the hunger for meaning"; Lipman wrote about its educational implications.[12])
4. *Effective learning results from intrinsic motivation*. Learning is the product of an interest in the topic studied and not (only) of the expectation of a reward or a fear of punishment resulting from learning or not learning it. "Task involvement" yields better learning than does "ego involvement." Learning needs both intrinsic and extrinsic motivation, but the former must be stronger than the latter.[13]
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 profile of intelligences.[14]
6. *Effective learning occurs in a dialogic environment*. All good learning contains an essential ingredient of dialogue, consultation, and offering and accepting support and criticism. Two heads are better than one; "distributed intelligence" is better than one "closed" in the individual mind.[15]
7. *Effective learning entails engaging in authentic problems*. Learning is best when it occurs in an authentic context, in which the learners grapple with a problem that they experience as "real" and "urgent," that bothers them, that involves their life plan or identity. Learning, like thinking, starts with an experienced problem.[16]
8. *Effective learning is advanced by ongoing 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.[17]
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.[18]
10. *Effective learning is the result of a productive theory of learning*. Learning is affected by the learner's implicit theories about learning. When learners relate their learning and achievements to their efforts and not to their ability, environment, or luck, their learning will be more effective.[19]

The list can be expanded to include other conditions for effective learning (for example, effective learning is a result of a supportive environment;[20] of participation and apprenticeship;[21] of mindfulness;[22] of "less is more";[23] of a meaningful narrative;[24] of systematic mediation;[25] of its occurrence in the "zone of proximal development"[26]). The main point is that effective learning is a multifaceted 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 creative attitude to oneself and the world.

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

Teaching Is More Than Telling

When learning is considered to be listening, teaching—as its possible mirror image—is considered to be telling. Thus this second atomic picture—teaching is telling—is superficial and based on our direct life experience. The question "What time is it?" is answered by "It's five o'clock." One person told, another listened and learned something new. However, this analogy is not necessarily relevant for effective learning (in this example the asker had an interest; students in school often do not have an interest, and therefore teachers add repetitions, exercises, and tests). At best, this analogy may be true of teaching only simple information. When complex ideas are taught, telling them simply is not good enough. Instead of declaiming information, teachers must create the conditions for effective learning. When effective learning is perceived as a complicated process of construction, as having a "soft" nature not amenable to full control and planning, teachers must move from direct to indirect teaching.

A split between "old education" and "new education" dominates much educational discourse. In the former the curriculum is at the center, whereas in the latter the student is at the center. Teaching in a Community of Thinking does not follow a single approach. In a Community of Thinking the encounter between the curriculum and the child takes center position. Individuals may develop—realize their potential—only within certain cultural contexts, which constitute their very existence.

Knowledge Is Not an Object

The third atomic picture of school education—knowledge is an object—is metaphoric. Those who possess knowledge can transmit it, as if it were an object, to those who lack it. The dominant pattern of teaching in most schools—the telling instruction—embodies this picture. One of the meanings embodied in the metaphor of knowledge as "object" is that people perceive it as existing outside of human consciousness and not affected or "infected" by it. Human consciousness, for its part, is not affected or "infected" by "nonrational" elements (such as drives, emotions, interests, sociocultural environment). 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 occurs, indicating that every important problem is well defined, possesses a short and correct answer based on indisputable facts, and, in addition, that someone knows the answer. While this practice transmit the picture of knowledge that knowledge is an object (or objective. Foerster: "Objectivity is the delusion that observations could be made without observer."[27]), this picture empowers this practice.

An alternative picture of knowledge (based on contemporary philosophy) depicts knowledge as dependent on active consciousness in contingent contexts. This picture complements the pictures of effective learning and indirect teaching. 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 "arbitrary" components. 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 contemporary picture of human knowledge.

Knowledge, therefore, is not an object and is not a copy of the world. Knowledge is a structure or even a "story that works." Man is *homo narrativus*, one who tells himself stories about the world in order to endow it with order and meaning, to understand it, and to 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 (subjected to accepted standards of knowledge construction; knowledge as a "story" or "structure" does not lead to a "vulgar relativism"[28]).

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 a descriptive picture. It states the aim of education, the "product" of the educational process. Teachers' practice in the classroom is the source of it. Teachers transmit knowledge by lecturing and demand that students externalize it in answers to questions in the classroom, in homework, and in examinations, in order to check whether students properly absorbed the knowledge transmitted. To motivate students to learn, teachers reward satisfactory externalizations, and students adapt accordingly. The common externalizations in school require the recycling of knowledge, through its memorization and "retention" until the time of the ritualistic externalization. The result of this process is what Perkins has termed "fragile knowledge syndrome."[29] Knowledge becomes inert (inactive, useless knowledge that is not transferred to contexts other than that in which it was learned), naïve (intuitive, incorrect preschool knowledge), and ritualistic (useful to demonstrate in school, sufficient for school tasks, but not entailing real understanding). In other words, school knowledge is intended for externalization and, therefore, frequently is not internalized.

In this "era of knowledge," knowledge should not be glorified and imparted as if it consisted of objects. Rather, teachers should foster a favorable, critical, and creative attitude toward it.

"Educated people" are not those who know, who have many "objects" in their head. Rather, "educated people" know how to relate to knowledge. They are challenged by it and are at home with it. They treat knowledge critically, pass it through an "inner locus of evaluation." They try to reinterpret it creatively, to view it from additional perspectives, and to add to it.

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*

Our proposed school model is called Intel-Lect School (Intel Electronics of Israel supported our project), and its proposed classroom model is a Community of Thinking. The Community of Thinking model replaces the traditional atomic pictures of schooling with the following alternatives: to learn is to be involved and to construct understanding (or, as Piaget put it, "to understand is to invent"[30]); to teach is to create conditions for effective learning; knowledge is a human structure or "a story that works"; and to be educated is to relate to knowledge in a positive, critical, and creative manner. The Community of Thinking framework unfolds in three stages: fertile question, research, and a concluding performance.

The idea of a Community of Thinking has no pretenses about being a conceptual or practical breakthrough. It provides a framework for teaching and learning that is rooted in Dewey's ideas and that branches out to contemporary concepts of teaching, learning, knowledge, the individual, and society in our times. The Community of Thinking is an alternative to the traditional classroom. It is a community because it deals with a group of learners working together on a common problem by accepted means. It is a thinking community because its main "work" is intellectual.

In this community, thinking is grasped in a "strong sense," that is, not merely as procedures of calculation and deduction, or "thinking skills," but as a multifaceted cognitive activity with social, conceptual, linguistic, emotional, motivational, physical, and other dimensions. From the point of view of teaching and learning, the most important dimension of the model is motivational: the first, basic step in fostering thinking in learners involves them in thinking about the subject being learned, motivates them to think, encourages them to think by themselves (*Sapere aude!* "Have courage to use your own reason!" in Kant's famous phrase). Fostering thinking encourages students to think with full involvement and to discover the joy of thinking. ("The use of reason is a passionate business," said R. S. Peters.[31])

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 students cannot experience it. ("Students in school," John Holt remarked, "are too busy to think."[32]) A "smart school," according to Perkins, is simply a school in which students think about what they are learning.[33] The emphasis on involved thinking—intensive thinking about what students are learning—has far-reaching

educational significance for methods of teaching and school organization.

The Pedagogy of Questioning: Inventing Fertile Questions

On the Nature and Nurture of Questioning

Creating questions is a human trait par excellence. Man is a *homo quaerus*—a questioning man, incessantly asking questions in his quest to understand himself and the world around him. This trait—the ability and the inclination to ask questions—has some basic, paradoxical characteristics of practical educational significance.

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. Questions are human inventions that do not exist in the world like other objects—stones, houses, or people, for example. 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 asking consciousness removes itself from *what is present* toward the *reasons for it* 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 beliefs about school teaching, those who do not know have questions. Questions therefore have a dubious status in society and especially at school. Clever students have answers; lazy students have questions (because they did not listen to the teacher, did not do their homework, were absent from class, and so on). This belief about questioning as being based on "absences" (of the individuals or of their 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.

Questioning simultaneously blocks motivation and awakens it. Contrary to popular belief that people tend to ask about the nature of phenomena in the world—to wonder about them—people do not tend to ask such "big" questions. Such questions undermine the cognitive equilibrium people work so hard to preserve. This loss of equilibrium creates distress. But when a "big" question is invented, it may be a great source of energy for investigation. Striving for renewed equilibrium, for an answer or solution, motivates human learning.

Questioning fashions the answer. Contrary to common belief that an absolute gap separates question and answer—the question is known and the answer is completely unknown, with open-ended possibilities—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.

Teaching focused 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 (1) create an educational atmosphere that enables and encourages creativity through respect for the autonomy of the learners, that is, for their questions; (2) present knowledge in a way that will stimulate questions; (3) undermine the cognitive constructs of the learners, so as to

motivate learning; and (4) bind knowledge to questioning, so as to show how each piece of knowledge is conceptually (as well as motivationally) determined by the questioning that preceded it.

A Fertile Question

The pedagogical model of a Community of Thinking places the question at the center of teaching and learning. It deflects teaching from a 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 to find or to invent a fertile question. A fertile question can be described in terms of six basic characteristics:

1. *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.
2. *An undermining question*—a question that undermines the basic assumptions and fixed beliefs of the learners; casts doubt on the "self-evident," on "common sense"; uncovers basic conflicts lacking a simple solution; and requires thinking about the roots of things.
3. *A rich question*—a question that requires grappling with rich content indispensable to understanding humanity and the world, that is impossible to answer without careful and lengthy research, and that tends to break up into subquestions.
4. *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.
5. *A charged question*—a question having an ethical dimension, a strong emotional and ethical charge able to motivate learning and inquiry.
6. *A practical question*—a question that can be developed into a research question; a question about which information is available to students.

Table 1 presents examples of fertile questions asked in Israeli Communities of Thinking.

Table 1. Examples of Fertile Questions

In a Community of Thinking, the fertile question is Archimedes' fulcrum of teaching and learning—not a given, but an invention. In novice Communities of Thinking, the teacher poses it; in more advanced communities, students are drawn into the process and begin to pose the fertile question.

Teachers in a Community of Thinking suggest to learners a fertile question in the framework of the school subjects that they teach. The Community of Thinking model converts the traditional school subject into "pedagogical discipline."

Teaching in a Pedagogical Discipline

Teaching in a Community of Thinking aims to foster disciplinary thinking for several reasons. The theoretical disciplines are the best tools available for understanding ourselves and the

Table 1. Examples of Fertile Questions

- The Human Genome Project—a curse or a blessing? (Biology)
- Why do we sleep? (Biology)
- Why is the sky blue? (Physics)
- Is it possible to establish a "New Middle East"? (Geography)
- Is Israel on the verge of a civil war? (History)
- Is there progress in history?—The case of the 19th century (History)
- What makes a "good story"? (Literature)
- Who is "the other"? (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)
- Australia—West or East? (Multidisciplinary)

world, for organizing knowledge, for disciplining thinking, for criticizing existing knowledge, and for producing new knowledge. These theoretical disciplines enable us to understand the "deep structure of the world"—that is, to transcend our direct experience, our intuitions, and to understand natural and human phenomena in a deeper, more abstract way. (As Perkins states, "The world does not wear its deep structure on its sleeve."[34]) Moreover, in contrast to the many thinkers who believe that thinking tools (heuristics, strategies, tactics, and so on) are the most important component of good thinking, the Community of Thinking model presumes that disciplinary knowledge is the most important thinking tool.

Yet the Community of Thinking model does not propose to organize knowledge for the purpose of school teaching in the framework of theoretical disciplines. Instead it offers a new concept—a pedagogical discipline. In the lively discussion between those supporting disciplinary teaching and learning and those who advocate interdisciplinary teaching and learning, both groups wrongly assume that schools teach disciplines. The "conservative" group wishes to continue doing so, whereas the "progressive" group advocates various combinations of disciplines.

As a matter of fact, schools do not teach disciplines but rather school subjects. The school subject is a unique school creation. It differs from the theoretical, academic research discipline in several essential aspects. The aim of the subject is to impart existing knowledge, whereas the aim of a discipline is to create new knowledge. The questions asked in teaching the school subject are closed, whereas the questions asked in the framework of a discipline are open ("scientific puzzles"). In teaching school subjects, the emphasis is on accepted knowledge, whereas in disciplinary research, the emphasis is on controversies and dissent within the paradigm. The thinking fostered by teaching a school subject is predisciplinary and static, whereas the thinking fostered in disciplinary research is thinking from a narrow disciplinary perspective. Information used in teaching a school subject usually comes from school sources, mainly textbooks and the teacher's words, whereas a discipline's research has at its disposal primary sources, such as observations, laboratory experiments, and historical documents. The number of school subjects studied in school may range from 5 to 10, whereas a researcher is involved with one discipline only, occasionally "digressing" to related ones. Students in school are expected to recycle information transferred to them, whereas researchers are expected to create new knowledge.

These examples illustrate some of the essential differences between a research discipline and a school subject. Still, this distinction does not imply that the school should change from teaching subjects to teaching disciplines. The role of the school is not to produce able researchers. The Community of Thinking model replaces the term "school subject" with "pedagogical discipline."

The concept of pedagogical discipline recognizes the organization of human knowledge for an "internal" educational purpose—for example, the development of learners' ability to think in an involved, skillful way, on the basis of knowledge. 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 it. The nature of the questions asked in this framework is exemplified by the term "fertile question." The approach to knowledge in a field stresses the central ideas and controversies of the discipline. The

quality of thinking it fosters is systematic and multifaceted (derived from involvement in several communities of thinking and active engagement in metadisciplines—"higher-order knowledge"). The sources of information feeding it are various and depend to some degree on the interests of the learners. The number of knowledge areas in which learners are simultaneously deeply engaged depends on their ability to do so; three is typical. The main cognitive performance is understanding, the basis for critical and creative thinking. Thus, fertile questions asked in the framework of a pedagogical discipline constitute the "field" on which the Community of Thinking "plays."

Initiation

Questions arise from initial, vague responses to them. Certainly, previous knowledge is needed in order to ask a good, fertile question. Initiation into disciplinary knowledge is conducted alongside the process of finding or inventing fertile questions, and facilitates it. Initiation is conducted by means of various teaching methods (such as lectures, supervised text reading, cooperative learning, peer teaching). Its questions focus on (1) connecting knowledge to the questions that created it ("archaeology of knowledge"); (2) awareness of questions raised by responses to original questions (every "solution" creates additional problems); and (3) creating a question bank—questions around which inquiries 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 occurs during questioning, during research, and during preparation of 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 and examine research questions—subquestions, or aspects, of the fertile question.

A good research question must be interesting to students and possibly also interesting "objectively" (for example, by being an original question, shedding new light on a phenomenon, or shaking taken-for-granted convictions); open (requiring that the researcher take a position and not only report facts); rich (requiring deep and reasonably lengthy research); connected to the main fertile question and to the domain of knowledge; and practical (able to be turned into a focused research question). Research teams must show how the subquestion they've constructed adheres to these criteria.

Crafting the crude question into a successful research question is the task of the teachers and the students of the Community of Thinking. The students 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. Learning in a Community of Thinking is based on cycles of teamwork and whole-class discussions and lessons. The whole community is mobilized at various stages to aid the research teams. One such stage is the discussion of the teams' research questions. The teams present their questions and the community examines them according to the agreed criteria and

suggests improvements or alternatives. The stage of elaborating the question is critical; it determines the fate of the research that follows.

After the coach and learners have approved the research questions, the research teams begin the research itself, using an agreed method. This phase includes a general component and a disciplinedependent component, as well as pre-research directions for the research itself. The following are examples of pre-research directions:

1. Formulate your research question.
2. Try to raise preliminary thoughts or hypotheses to answer the research question.
3. Break the research question into subquestions.
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.

This general procedure contains a discipline-dependent component. The questions, hypotheses, information sources, tasks, concluding performance, research tools, and rules of verification 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 encouraged to search for information outside the school. One of the key phrases in a Community of Thinking is "the world as a text," that is, 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 at 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 begin their research, aiming to answer the question according to their plan. This is a difficult stage to manage. Teachers must orchestrate an entire class of teams, each of which is autonomous yet lacks experience and discipline. The educational effectiveness of this stage, and of the Community of Thinking as a whole, depends to a large extent on teachers' ability to reach and guide each research team. Original approaches must be found to increase the working time of the coach with teams, such as working with research groups after school hours, introducing other adult coaches (such as parents, university students, or retired people

with appropriate skills), or training older students to guide younger ones.

Work in the entire Community of Thinking continues alongside the research work of the teams. It occurs in the form of initiation as well as reciprocal teaching: research teams that have developed a "first draft" of their research present it to the entire community in order to get feedback. The cyclical character of work in a Community of Thinking—from the entire community to research teams and back to the entire community—epitomizes the dynamics of working in a Community of Thinking. The aim of this cycle is to place each group's research into the overall picture created by the whole community.

Research occurs as the "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 academics (mathematicians, biologists, historians, literary critics), 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 that focus on the learners' development.

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. The operation of knowledge—its creation, criticism, analysis, composition, application, reinterpretation, and 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.

This concluding performance comprises two parts: teams' performances and a communal performance. In the first part, each team presents its project (usually in the form of a written paper, but possibly in the form of a documentary film, dramatic performance, or work of art) to a committee of teachers, experts, students, and parents in order to get a formative assessment (based on criteria discussed and defined by students and teachers). In the second part, the entire Community of Thinking presents to the entire school community the various ways in which it grappled with the fertile question. The communal performance is a festive evening, with students celebrating their achievements in front of an audience.

The Community of Thinking focuses on the rehabilitation of learners' 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. In the fertile question stage, the undermining nature of the question is intended to create motivation in order to restore lost equilibrium. In the research stage, focused research involves learners in the topic under study in order to cause intellectual and emotional "investment" (investment of "the self" in an object; Freud called this process "cathexis"). 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.

Understanding Performances

John Holt wrote in the classic *How Children Fail:*

> 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.[35]

At Harvard's Graduate School of Education and Project Zero, this concept of understanding is called "understanding performances."[36] This concept complements the concept of understanding as a representation, a reflection in consciousness of the state of affairs in the world. It defines thinking with knowledge—understanding performances—as construction and manifestation of understanding. This is a productive concept from an educational point of view, in as much as it extracts understanding as an internalized representation from its mystery and passivity and converts 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 of understanding as intellectual performances is vital to the stage of concluding performance—both for the performance and its assessment. The understanding performances (in their various forms, as shown in Table 2) are used as central criteria for the concluding performances of teams and community alike, and for their assessment by the learners, teachers, and outside experts.

Table 2. Understanding Performances

A Coherent System

The process of teaching and learning in a Community of Thinking differs significantly from the process described earlier as the "grand picture of schooling." When compared with Figure 1, Figure 2 clearly portrays the difference.

Figure 2. A Community of Thinking

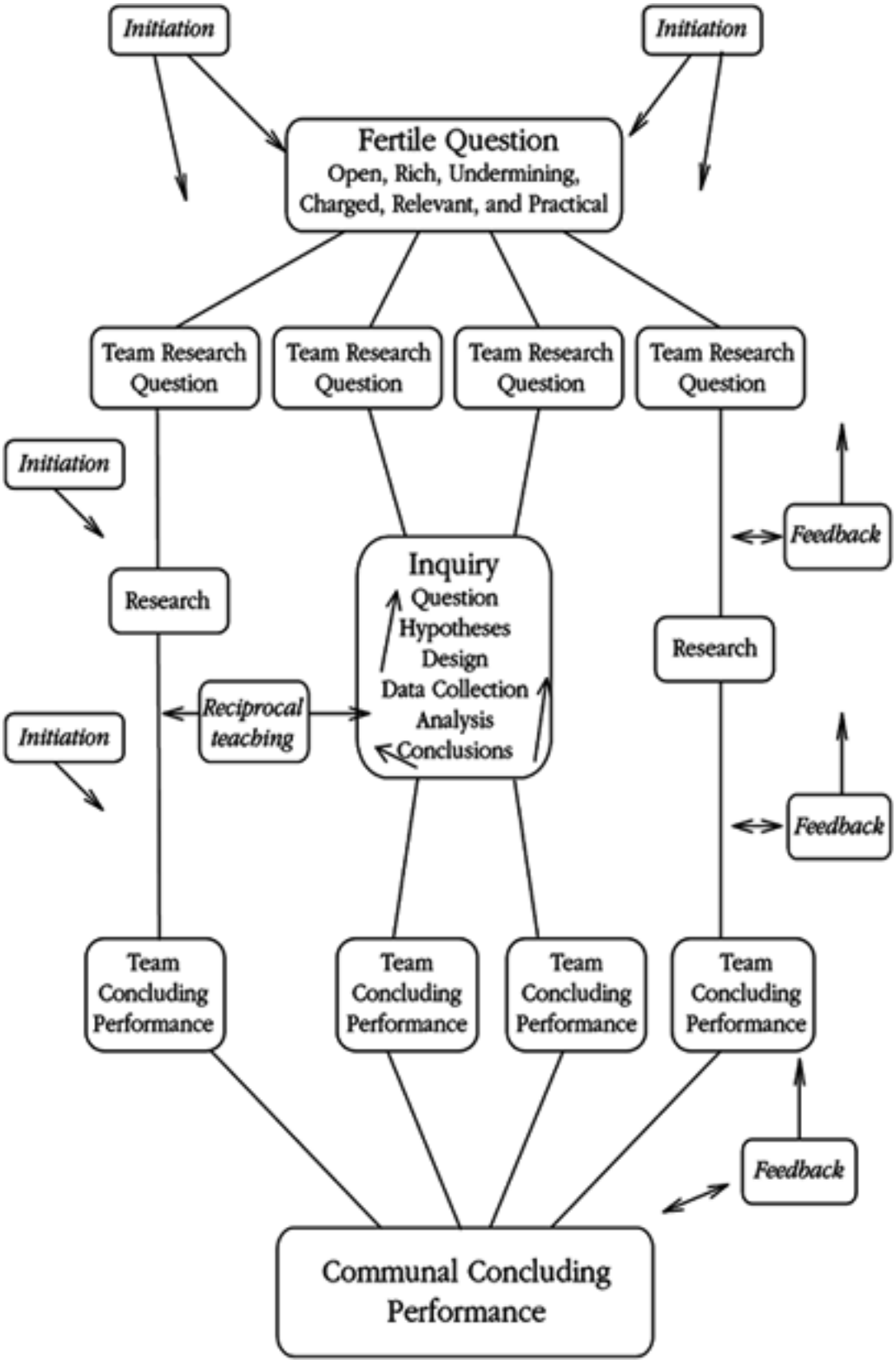
But school is a coherent system. Therefore significant change must affect not only the classroom but also the entire school. In other words, meaningful changes in teaching and learning in school may be understood as points on two main axes: (1) teaching method, because in teaching the medium is the message and the pattern of instruction is the (real) content of instruction[37]; and (2) the school's organizational structure, because the practical routines or regularities of school determine the essence of school education.[38] We aim to

Table 2. Understanding Performances

Types of understanding performances may be understood as learners...

- Express knowledge in their own words
- Bring examples of knowledge
- Generalize from an item of knowledge
- Identify knowledge in different contexts
- Place knowledge in context
- Explain phenomena by the use of knowledge
- Give arguments for knowledge
- Justify knowledge and provide evidence for its justification
- Compare cases, phenomena, and claims
- Transfer knowledge from one domain to another and to life experience
- Discover contradictions and tensions in knowledge
- Formulate knowledge that contradicts knowledge (or claims)
- Foresee possible results of knowledge
- Break knowledge into its components (analysis)
- Unite components of knowledge (synthesis)
- Criticize knowledge on the basis of knowledge
- Create knowledge on the basis of knowledge
- Identify basic presumptions of knowledge
- Create a simulation, metaphor, or model
- Present knowledge in an interesting and clear way
- Ask a (fertile or non-banal) question

Figure 2. A Community of Thinking



change the teaching method in school into that of a Community of Thinking[39] and the general organizational structure of the school into the structure of an Intel-Lect school. The outline of the structural change is a topic for a future article.[40]

Endnotes

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[40] A book my colleagues and I wrote, *Community of Thinking: On the Road to Intellect School*, is available only in Hebrew. I hope to translate it into English.

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