Webbed Understanding: A Conversation for Understanding

Yoram Harpaz
Beit Berl College, Israel

Abstract

Teaching for understanding is an important educational theory and practice that has generated an enormous body of theoretical and practical literature in recent decades. To give structure to the concept and facilitate its application in the classroom, the present article resolves the concept of teaching for understanding into three distinct, key questions and addresses each separately. What is the essence of understanding? Which content is worth understanding? How should we teach for understanding? The answers to these questions are addressed in a dialogic style that explores the concepts of understanding in terms of making correct and systematic relationships, the meaning and role played by "big ideas," and how these considerations impact the development of curriculum geared towards developing understanding. To support application of these ideas in the classroom, the concepts are graphically illustrated in tables and with concrete examples of curriculum design.

Introduction

The concept of teaching for understanding has received an enormous amount of attention from both educational theoreticians and practitioners in the last two decades. Partly, this attention it the result of the "ironic path" that the influential teaching thinking movement traversed. The approach of teaching students to think originated as an alternative to teaching knowledge (knowledge that would be forgotten). Inevitably, however, it was necessary to refocus attention on knowledge because good thinking simply cannot occur in the absence of knowledge. The resolution of this conundrum was to teach for understanding. Good thinking stems from understanding of the knowledge in the realm one thinks about and with which one thinks (Harpaz, 2011, pp. 39-46).

The importance and popularity of the subject has proven to be a two-edged sword. Teaching for understanding have given rise to such a vast body of literature and to such a profusion of specific methodologies that even the most highly motivated classroom practitioners may well feel confused if not overwhelmed. What is sorely needed is a judicious analysis of the "very big question," What is teaching for understanding?, in order to provide a workable foundation for thinking about the subject and putting the theories to practical use. To achieve this goal and in the hope of making teaching for understanding more understandable, this article is formulated as a conversation.

Could you please tell me what exactly is "teaching for understanding"?

Well, it's a very big question. Let's begin by dividing it into three big questions, and discuss each in turn. The three questions are: What is understanding? What is worth understanding? And how do we teach for understanding? We'll call the first question "the essential question"; the second, "the value question"; and the third, "the practical question." As may be apparent, these questions follow a logical progression.

We need to know something about the essence of understanding in order to promote it. We also need to know to which worthwhile content or subject matter to direct it. And, ultimately, we need to know how to promote and direct it effectively.

A good point of departure is John Dewey's definition of understanding: "To grasp the meaning of a thing, an event, or a situation is to see it in its *relations* to other things." (Dewey, 1933/1998). We, therefore, may say that to understand something, a phenomenon or a concept, is to relate it to other things, i.e., to other phenomena or concepts. Understanding applies to relationships; relationships are the content of understanding (Newton, 2000).

Could you give an example?

Let's consider the concept "democracy". When we want to understand what democracy is, we relate it to other relevant concepts.

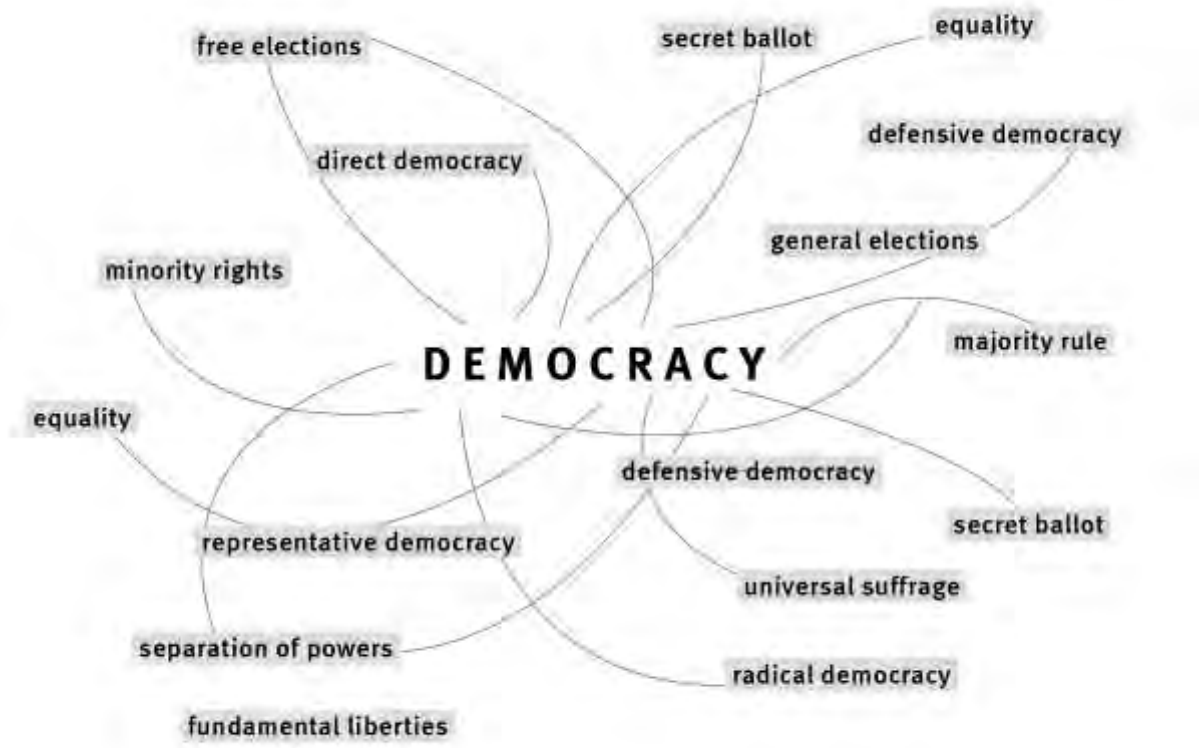


Figure 1: Democracy as a webbed concept.

At first blush, Fig. 1 may suggest brainstorming—the idea of retrieving relevant information on a subject. But understanding is *not* brainstorming. First, understanding does not contemplate just any sort of relating. Rather, the content of understanding is *correct relationships*. Second, the relationships that are forged must be reasonable. The content of understanding are *systemic relationships*.

What are "correct relationships"?

Correct relationships are relationships that conform to the rules of producing and verifying knowledge in the relevant field, i.e., the field in which we are trying to achieve understanding. For instance, assume you were to add "climate" to the democracy web of Fig. 1, claiming that democracy can flourish only in a certain climate. We would say that your understanding of democracy is incorrect since it cannot be verified on the basis of the accepted rules of the discipline that deals with forms of government, political science. (Incidentally, Montesquieu, one of the fathers of this discipline, thought that there are causal relationships between kinds of climates and forms of governments.)

The relationships a person makes between phenomena or concepts in a given field correspond with the rules of generating and warranting knowledge in that field. Understanding is not a personal event in which anyone can relate as he or she wishes; the relating should be reasonably correct, i.e., subject to rules of scientific method or rules of interpretation. There is an element of general and accepted truth in understanding. You cannot understand something that is completely idiosyncratic.

Sometimes the truth is analytical as in math; sometimes it is empirical as in physics; and sometimes it is interpretive (or hermeneutical) as in literature. In any case, it corresponds somehow to the state of affairs in the world or in a text. If, for instance, there is a mismatch between the network of streets in a certain city and the representation you have of those streets in your mind, you are bound to get lost.

For that problem we have the Waze app . . .

Indeed, technological means, such as GPS navigational software, are reducing the spaces of human understandings. Artificial intelligences understand for us. While they lack a sense of understanding and, therefore, are mindless, in their own mechanical, computational ways they do understand very efficiently. It will be interesting to see how this crucial detachment of intelligence and mind will affect understanding and other functions of our mind—whether it will empower or stagnate them.

What are "systematic relationships"?

Systematic relationships are relationships guided by a principle. In the process of understanding, we relate phenomena or concepts according to some guiding principle. The principle is implicit in our question, which imparts what we want to understand. We may, for instance, ask about the essence of democracy or about the connection between democracy and economy or law or education or anything else. In such cases, the conceptual web we will weave around democracy will not be associative or intuitive, but disciplined and systematic.

When does this process of relating correctly and systematically stop? It must stop somewhere or else it will be infinite.

In theory, the conceptual web that constitutes understanding is infinite since each concept in the web connects to other concepts and so forth. That is, a complete understanding of a tiny thing necessitates understanding of the whole world. But our process of understanding is limited by the principle that guides our weaving and by the real life context in which we understand. The principle frames the process of relating, and the context puts limits on it. We stop the process of relating when the answer satisfies us in the given context.

And what is "relating"?

Relating, as we said, is generating affinities between phenomena or concepts. In this respect relating is a creative process, since you don't see relationships; you create them. When people say "I see" when they understand, they manifest the common and misleading perception that relationships between phenomena and concepts are seen or accessible like the phenomena and concepts themselves. In fact, when you relate phenomena (in causal relationships) or concepts (in logical relationships), you go beyond them and create or invent (Piaget, 1973)) something new. Most of the time this creation is prosaic, but sometimes it is rather creative. And since understanding is a creative process performed in and by the individual mind, it cannot be transmitted directly from one mind to another like information. The individual has to construct it in his or her own mind and, therefore, it is hard to understand (whenever the relationships are not prosaic).

I see . . . Sorry, understand. In understanding we create various kinds of relationships.

Depending on the field, we create causal, conceptual, logical, numerical, spatial, tonal, or other sorts of relationships. The scientist creates causal relationships; the philosopher, conceptual relationships; the lawyer, logical relationships; the mathematician, numerical relationships; the architect, spatial relationships, the musician, tonal relationships; and so on. Most of the relationships that understanding applies to, however, are causal relationships. In most of our daily life and in most scientific work we try to understand "what caused it and/or what it caused." For instance, if we hear a blast right now, we are immediately inclined to grasp what caused it and what effect it caused.

These causal relationships also can be divided into two kinds: causal relationships between things and causal relationships between humans. Think about causes in the natural realm such as pressures, speeds, or temperatures. Then think about causes in the human realm such as intensions, thoughts, or feelings. Causal relationships in the natural realm are fixed and measurable forces that act upon each other, whereas causal relationships in the human realm are fluid forces stemming from minds bounded by society and culture. Hence, understanding things and understanding humans have different qualities, as Wilhelm Dilthey unpacked in his well-known concept of *Verstehen* (Dilthey, 2010).

Say a bit more on these two kinds of casual relationships.

Understanding things is external and general, and understanding humans is internal and particular. In order to understand causal relationships between things, we observe them from "the outside." When we discover or invent, as the radical constructivists claim (Von Glasesrfeld ,1995), such relationships, we generalize from this particular case to all similar things in similar conditions. What interests us then is not the particular thing we observe but the generalization—the general rule, process, phenomenon—that it verifies or refutes.

By contrast, in order to understand causal relationships between people we observe them from "the inside"; we "feel" them through identification or empathy. And when we recognize causal relationship—a comment that gave offense, for instance—we cannot make the generalization that "comments cause offence," since one person may be offended by certain comments while others accept them amiably.

The point is this: Where humankind is concerned there are no generalizations! The concept of "human nature" was "discovered" by philosophers, psychologist, biologists and others who discourse endlessly about the concept of "human nature." But each individual is a unique version of whatever that is, be it a will to power, a will to survive, a conflict between components of the psyche, a search for meaning, selfishness, altruism, or any other manifestation of "human nature." Moreover, when a person becomes aware of his or her "human nature," he or she can change it. People, in contrast to things, understand themselves and adjust their behaviors accordingly. "Human nature" is not forced upon humans like the nature of things is forced upon things. And this is also a comment on "human nature."

Thanks for clarifying this point. Now let's move on to the second question: What is worth understanding?

One more comment concerning the first question before we move on. When someone wants to understand something, she doesn't say to herself, "Let's web it!" Something provokes a question in her mind and she tries to answer it. This "something," by the way, doesn't manifest itself in a form of a question. Rather, the question mark is attached to it by the questioner. Hence, the act of questioning, like the act of understanding, is inventive: the one who questions or understands introduces questions or understandings to the world. And beyond that, the act of understanding is not mechanical or computational. It is the product of our excited mind—wonderment, engagement, frustration, satisfaction, etc. Israel Scheffler wrote in this spirit on "cognitive emotions (Scheffler, 1991)," and David Perkins wrote about "hot cognitions (Perkins, 1992)."

Okay. Now we can move to the second question . . .

One more comment please before we move to the second question. We can talk about the conceptual web that is generated in the process of understanding in terms of context. In other words, to understand something is to put it in a context, i.e., something becomes understood or meaningful when it is located in a context. The meaning of something does not reside in the thing itself (as Dewey claimed in the opening quotation), but in its context, in its web of relationships. The various contexts lend it different meanings. Think, for example, of the act of zooming out—picturing an object in a larger context that lends it a new meaning. And note: we zoom out or in according to our

interests, according to what we wish to understand and do. It makes sense to claim, like the pragmatist philosophers, that the will to understand stems from the will to act. And it also makes sense to claim with Ludwig Wittgenstein that the web of relationships that lends meaning to something—the context—is the web of its uses (Wittgenstein, 1963).

And a last comment in the context of the first question. The denser and more abstract our conceptual web is, the deeper our understanding is. That is why we talk about deep or superficial understanding. And, likewise, understanding of complex phenomena or concepts is an open-ended task, an infinite endeavor of deepening and refining our understanding.

What are the preconditions for deep or superficial understanding?

There are many. Let's comment on the most important one: A new understanding is always conditioned by previous understandings with which we approach the world. Understandings, as well as misunderstandings, are generated on the basis of pre-understandings and pre-misunderstandings. And misunderstandings are robust and resist replacement since they develop in an early age, correspond to our intuitions, and explain a lot. (Consider stereotypes or clichés.) But it's very important to replace them because they lay shaky foundations for building new understandings.

Sometimes new concepts or phenomena are assimilated smoothly into our conceptual web, and sometimes they create problems and force us to adapt our conceptual web in order to accommodate them. This is how Jean Piaget understood understanding—as a process of assimilation and accommodation (Piaget, 1985). Accommodative understanding, whereby one has to change his or her conceptual web, involves cognitive distress, since people identify with their understandings' webs and are not willing to readjust them. Understandings, as we already pointed out, are not cold cognitions; they are wired into our identity. (Perhaps our identity is the sum of our understandings, at least those which touch existential issues.) Hence, people are inclined to understand accommodatively only when they are undermined, when they experience internal problems (contradictions in their web) or external problems (their web fails to capture a phenomenon or a concept they seek to grasp).

Thus, undermining motivates people to learn and to understand. Learning and understanding are mechanisms calculated to restore the undermined cognitive equilibrium. People, according to Piaget's pessimistic notion of learning and understanding, tend to learn and to understand only when they are unsettled. But note that undermining as an instructional means should be used with a pedagogical tact. When it is too zealous, people tend to be defensive or aggressive. Socrates, as you remember, undermined the Greeks too strongly, and they condemned him to death.

But we shouldn’t be too pessimistic concerning the nature of understanding. Understanding involves enjoyment too, especially in the assimilative form. When you say "got it" you mean that a new concept was comfortably incorporated in your web, it was assimilated. This incorporation sometimes involves a feeling of "click" that is called insight—a sudden and eye-opening understanding. This insight involves enjoyment (unless its contents are sad). But note that the enjoyment of an insight is not necessarily evidence of understanding. Sometimes people experience exciting insights, even to the point of illumination (then they might become dangerous), but they don’t understand at all. And sometimes the opposite is happening: people understand a lot without experiencing a high feeling. The feeling of understanding is misleading.

I'm a bit undermined. Does understanding entail generating a conceptual web or incorporating a concept into it?

The answer is both. There is a cognitive stage in which we generate a web of relationships, and there is a stage after we have established the web in which we grasp phenomena or concepts in our web. Weaving a conceptual net is a hard work, while grasping a new concept with it is a moment of a cognitive satisfaction. And sometimes when grasping a concept in the existing net is failing and we can no longer deny it, we have to generate a new net or fix the existing one. Generating our

conceptual net or fixing it is a life process. Actually, it's the life's meaning. As Socrates said, life without inquiring, without seeking deeper understandings, is not worth living.

Okay, I think we webbed understanding pretty well considering the context of our informal conversation. Now we can turn to the second question: What is worth understanding?

There are a few possible answers to this question. The answers depend on the context. In our case, the context is the kind of education we are talking about and our pedagogical perspective. We are talking about school education and, to my way of thinking, our pedagogical perspective is pragmatic acculturation.

Let me explain. It is important to bear in mind that teaching for understanding is not the final aim of education. Our concern must be identifying the aim of teaching for understanding. Education, as a few philosophers have claimed rather convincingly (Lamm, 1976; Fenstermacher, & Soltis, 1986; Schubert, 1986; Egan, 1997), has three "super-aims" or three meta-perspectives or paradigms. Actually there are three educations: education as socialization, education as acculturation, and education as individuation. The super-aim of education as socialization is to impart to the students knowledge and skills for practical success in life. The super-aim of education as acculturation is to shape the students' character in the light of the truth and values that constitute the preferred culture. And the super-aim od education as individuation is to enable and support the self-fulfillment of each individual student.

The aims of teaching for understanding are derivative of these three educations: understanding for the sake of practical achievement (socialization); understanding for the sake of understanding (acculturation); and understanding for the sake of self-fulfillment (individuation). Choosing a super-aim and choosing the aim of teaching for understanding are not the product of scientific findings or objective observation but, rather, a function of our educational disposition or pedagogical sentiment (Harpaz, 2015).

The philosophical tone of our conversation attests to the fact that our pedagogical sentiment is disposed to acculturation and to understanding for the sake of understanding. But we are not idle philosophers who merely want to understand understanding. We want to teach for understanding, to make our students wiser. Accordingly, we are pragmatic acculturists.

Mmm . . . so, our question can be restated: "As pragmatic acculturists, what's worth understanding?"

In the spirit of our pedagogical sentiment, we vote with David Perkins for "big understandings," (Perkins, 2014), and with Grant Wiggins and Jay McTighe for "big ideas." (Wiggins, & McTighe, 2005).

Big understandings are understandings of big ideas. Big ideas are rich ideas. They are *rich in sense*: they explain a lot of phenomena and concepts. They are *rich in values*: they shape moral sensitivity. They are *rich in motivation*: they encourage learning and understanding. They are *rich in culture*: they originate from a cultural tradition and reinterpret it. They are *rich in presence*: they are applicable to many situations in our life. And they are *rich in doing*: they have positive impact on our behavior.

Owing to this richness, big ideas are very productive thinking tools. Generally, we distinguish between contents and tools. In this case, the contents are the tools—if we know how to think with them. And owing to this richness, we, the pragmatic acculturists, talk about *education for understanding* and not, as is typical, about *teaching for understanding*, because teaching for understanding in our educational version has an overall effect on the student—on the student's positions and dispositions.

Please suggest an example of a big idea

Think about the idea of sustainability in the environmental discourse. It explains many phenomena (from climate change to political tensions) and concepts ("greenhouse effect," "ecological footprint," etc.). It fosters ethical thinking, i.e., a readiness to sacrifice selfish interests for the general good. It produces motivation for learning and understanding by undermining and resonating content. It originates in the humanistic tradition and reinterprets it. It can and should be applied to many circumstances. It encourages and leads to commitment to many and varied activities.

Alternatively, you can think about big ideas like evolution in biology, narrative in history, separation of powers in civic studies, the unconscious in psychology, the human being as an end in itself in philosophy, representation in arts, gender in cultural studies, and many other central ideas in our culture.

But note that big idea should be formulated as a claim not as a concept or an issue. For instance, instead of "gender" (a concept), "gender identity is constructed by society and culture" (a claim).

In sum, we should understand big ideas and generate correct and systematic conceptual webs around them. And, in addition, we should understand how they themselves generate such webs. One might say that to understand a big idea is to understand the conceptual web that generates it as well as the conceptual web that the big idea itself generates. Big ideas by their nature, or their bigness, are conceptual webs. And they are not only big, they are also great insofar as they are breakthrough ideas that stimulate our wonder and admiration. The big/great ideas are the very best of our culture.

It does not mean that the preferred curriculum for understanding consists exclusively of a succession of big ideas. There are also small ideas ("niche understandings" is Perkins' term), but ideally, they are integrated into big ideas. And the big ideas are not taught in a succession of one idea after another like culture's greatest hits. We approach them through the mediation of "big questions." (Wiggins; & McTighe, 2013). At their inception, big ideas are answers to big questions. Frequently the questions were forgotten, especially in schools that throw bits of knowledge at students out of the blue, and we should restore them to life through an "archeology of questions." Big ideas gain meaning when we understand which questions they grapple with.

A characteristic of big questions that they don't have final answers, the kinds of answers that typically have been favored in schools. Rather, they have tentative or possible answers. The big questions that lead to the big ideas very often remain open and invite new questions. Big questions are never at rest.

How is a curriculum organized around big questions and big ideas reflected in the syllabus of an individual teacher?

A teacher for understanding organizes the contents of his or her syllabus around big ideas and extracts big questions from them. The architecture of a syllabus for understanding might look like this: A very big idea from which a very big question is extracted, and both the very big idea and the very big question function as a framework for a series of lessons. Each lesson is based on a discrete big idea and discrete big question that relate to the very big idea and very big question.

A teacher for understanding should know how to answer the question, "Which big ideas are you about to teach, and which big questions that point to them you are about to ask?"

Suppose you want to teach history based on the bestseller (sometimes bestsellers are good books) of Yuval Noah Harari's *Sapiens: A Brief History of Humankind* (2014). You probably agree that in our global world we can afford to liberate history teaching from its parochial, national outlook, zoom out, and teach from a broad, world outlook, a point of view that imbues historical events with new meanings.

Harari's book describes three revolutions that changed humanity: the cognitive, the agricultural, and the scientific revolutions. (Meanwhile, the present, fourth revolution is in progress, altering biological rules and generating a new human being, *Homo deus*—a new species that robs God of his abilities and relegates *H. sapiens* to history, just as *H. sapiens* did to their predecessor.) The book is rich in big ideas. One very big idea is the idea of imagined orders or imagined realities—an intersubjective reality originating from the imagination of many people such that many people imagine a certain reality and, by their common imagination, mold an objective reality that verifies their belief in the reality of their imagined reality. Religions, nations, democracy, humanism, corporations, money, are examples of imagined reality that shape the actual reality.

The idea of imagined reality is rich with all the characteristics of the big idea we talked about. The very big questions we can extract from it is: What generates reality? What sustains and changes it? Or what drives history? These ideas and questions are the lens through which the book describes and analyzes the three crucial periods of human history. The architecture of a *Sapiens* syllabus might look like this:

- **A very big idea: Imagined (intersubjective) reality molds real (objective) reality**
- **A very big question: What drives history?**

The cognitive revolution (70,000 years ago)**: Big ideas —**

- The cognitive revolution enables humans to commonly imagine reality;
- The imagined reality jump-starts history (initiates an ontological track that bypasses DNA); and,
- *Homo sapiens* gain an advantage over other human species and animals by force of their imagination.

The agriculture revolution (10,000 years ago)**: Big ideas —**

- The domestication (by wheat production) of humans and their imagination;
- The appearance of the imagined challenging future;
- Myths (par excellence a product of the imagination) bind many strangers;
- The invention of letters and numbers and their influence on the imagined order;
- The imagined gender order;
- Cultures as imagined realities imbued with contradictions; and,
- Empires, religions, and money as imagined realities.

The scientific revolution (500 years ago)**: Big ideas —**

- The imaginative origin of the modern science;
- The emergence of a culture of imagined ignorance;
- Imagination as the engine of capitalism; and,
- The permanent revolution initiated by the creative imagination.

The above big ideas are pregnant with big questions since, as you know, questions are born from imagined initial answers.

Fine. We can produce big questions from big ideas and get excited together, but our big questions are not necessarily big in the eyes of the students. In their eyes our big questions are simply school assignments to be disposed of as quickly as possible.

If that is the case, and too often it is, we must turn these into questions that are big in the students' eyes, to have them experience them as their own questions and as worthy of their efforts. As we have already observed, understandings are not transmitted from one mind to another. If the students do not engage their minds in the process of living the questions and coping with them, there is no chance for understanding.

So, how do we motivate our students to understand?

As may be apparent, we have entered into the zone of the third question, the practical one: How do we teach for understanding effectively? Otherwise stated: How do we motivate our students to understand?

School learning is overwhelmingly performative—students regard it as something to be done and over with—whereas learning for understanding should be "intentional learning," that originates from curiosity and a thirst for new insights (Bereiter & Scardamalia, 1989). We want our students (and their teachers) to ascribe value to understanding for the sake of understanding and work hard to achieve it; we want them to recognize this state of mind of understanding. Many of them do not experience it in school but, rather, identify understanding with knowing or remembering. In Lee Schulman's terms they suffer from the third pathology of school learning—fantasy. They think they understand but they don't. The other two pathologies that characterize school learning for non-understanding are amnesia and inertia (Shulman, 1999). For that matter, we have to change our students' intensions and their materialistic and utilitarian worldview (Pope, 2001).

It is important to recognize that the defective quality of students' learning is not their fault. It is a natural product of school, an institution that is not structured for education for understanding. From the school's perspective understanding is a luxury. Understanding is a demanding business, and it is widely believed that students can "do school" without it.

So, how do we motivate our students to understand? By their nature, human beings are motivated, even passionate, to understand—to relate phenomena and concepts, to put them in context, to make the world intelligible and friendly. We can reduce the passion for understanding to other passions like the will to power, to dominate, to survive, and so on, but we are not dealing here with the geology of passions. We only emphasize the fact that the passion for understanding is quintessentially human, and we can construct education for understanding on that foundation.

Rather than fueling the will to understand, the institutional structures of schools and colleges stifle it instead. To activate the will to understand we need to provide the necessary conditions: a challenging curriculum, provocative teaching, flexible organization, formative feedback, a supportive climate, enabling technology, an inviting physical environment, and so forth.

With respect to the curriculum, consider a curriculum for understanding founded on the principle of "multiple understandings"—understanding in sciences (external and general); understanding in humanities (internal and particular); self-understanding (psychology, bibliotherapy, group dynamics); understanding through the arts; understanding through the body; and others. What is evident is that there is one word "understanding" but multiple kinds of understandings.

And it's worth noting that big ideas and big questions should not be confined only to the usual school subjects. They should play out on the field of new disciplines like cosmology, neurology, behavioral economy, futurology, or on the field of multiple disciplines through cross-disciplinary big questions about the origins of poverty and prosperity, war and peace, and so forth. In fact, perhaps we should discard the concepts of school subjects and disciplines altogether and look for another, more fertile, concept.

But the school subject or the discipline is the foundation of schooling!

That certainly is true, but subjects and disciplines do not support education for understanding. Hence, we should find an alternative concept, another way to package knowledge.

The first step in this process is to distinguish between the terms "school subject" and "discipline" (Karmon, 2007). Educators tend to regard these terms as the same, but they are two different forms of knowledge organization. In contrast to the school subject, the discipline encourages

teaching and learning for understanding. But that's not necessarily the best approach for schooling. To illustrate that point, consider Table (1).

It should be apparent even from this summary table that disciplinary organization of knowledge is superior to subject-based organization in promoting understanding. Disciplines seeks to generate new knowledge, demand research work, operate in challenging zones, ask open questions, create rational knowledge and a reasonable picture of knowledge.

Table (1): Disciplinary organization of knowledge.

The organization of knowledge → Basic characteristics ↓	**School Subject**	**Discipline**
The ultimate goal	Transmitting existing knowledge	Generating new knowledge
The preferred cognitive performance	Final examinations	Research papers
The rule for choosing knowledge	Consensual and the certain knowledge	Controversial and the uncertain knowledge
Sources of knowledge	Secondary sources	Primary sources
The structure of questions	Closed	Open
The deployment of knowledge	From fewer topics in fewer school subjects to more topics in more school subjects	From more topics in more disciplines to fewer topics in one discipline
The quality of knowledge	Pre-disciplinary; "Fragile knowledge" (naïve, inert, ritualistic)	Disciplinary knowledge
The picture of knowledge	Absolute truth; knowledge as a mirror of nature	Getting close to the truth, to a better mirroring of nature

If that's so, why not organize school teaching and learning by disciplines?

Because the discipline is an organization of knowledge for producing experts, and that's the goal of the university. To a large degree, disciplinary understandings are niche understandings or even nano-understandings, whereas we aim for big understandings. As primary and secondary school educators, we do not grow experts; we grow "understanders"—people who understand big ideas and want to understand more.

So perhaps instead of talking about disciplines we should talk about "spheres of meaning." A sphere of meaning organizes knowledge in the framework of big ideas and big questions. Tracking the categories of the above table, the ultimate goal of the sphere of meaning is understanding big ideas and a motivation to understand. The preferred cognitive performance is a project (a research project, a piece of art) rich with understandings and insights. The rule for choosing knowledge is looking for big ideas.

The sources of knowledge are primary and secondary. The structure of questions is big questions. The deployment of knowledge is a small number (five, let's say) of spheres of meaning. The quality of knowledge that the sphere of knowledge cultivates is meaningful and understood knowledge. And the picture of knowledge it promotes is contextual and reasoned.

Big ideas are, by definition, meaningful ideas—both objectively and subjectively. From the objective point of view they are rich conceptual frames, and from subjective point of view they are motivationally rich. Hence, knowledge organized by the principle of big ideas generates sphere of meanings.

What makes a big idea "motivationally rich"?

A big idea has the potential to provoke a motivation for understanding because it undermines and resonates. It undermines because it challenges students' understanding webs and compels them to restore them and resume to their cognitive equilibrium (which should be undermined again and again), and it resonates because it explains many phenomena and concepts that students vaguely know or "feel" and want to clarify to themselves. The undermining generates tension, and the resonating resolves the tension. A teaching for understanding is done dialectally by means of these two instructional processes.

A dialectic instruction guaranties understanding.

No teaching and no teacher can guaranty understanding. Understanding is accomplished by the student for the student, but good teaching and a good teacher can support this process, and help him or her to construct understanding.

Let's give teaching and teachers for understanding one more boost. From a practical point of view, understanding understanding as a conceptual web has a weakness since it difficult to know if a student understands, if he or she has a dense, correct and systematic web of relevant concepts in mind. The minds of others are not accessible to us (thankfully), and the student's mind is inaccessible to the teacher. But we can make understanding accessible, a public event, if we define it differently—as a performance. Perkins and his colleagues (Wiske, 1998), distilled understanding to a series of "understanding performances"—thinking operations with knowledge. To understand is to think flexibly with knowledge. Perkins suggested seven understanding performances; we suggest eighteen understanding performances divided to three categories:

Table (2): Peformances categories:

To present knowledge	Manipulate knowledge	To criticize and create knowledge
To express knowledge in your own words	To analyze and synthesize knowledge	To give reasons and justify knowledge
To summarize knowledge	To suggest example, metaphor, analogy, comparison	To reveal contradictions or tensions in knowledge
To explain knowledge	To generalize from detailed knowledge	To question knowledge
To suggest interpretations of knowledge	To predict from knowledge	To reveal basic assumptions of knowledge
To represent knowledge in various ways	To contextualize knowledge	To formulate counter-knowledge
To present perspectives on knowledge	To apply knowledge	To create knowledge on the basis of knowledge

The performative view of understanding reduces the concept of understanding to thinking. Understanding is not a state of mind but an activity—an intellectual activity or performance. And note that an understanding performance must be done well, otherwise it is low quality performance (a student asking a trivial question, suggesting a banal metaphor, etc.) or a misunderstanding performance (a student misinterprets, explains ineffectively, generates mistaken ideas, etc.). And note further that an act of thinking with knowledge does not necessarily reflect one understanding performance, but a several.

I'm undermined again. If understanding is performance, why did we invest all the effort and time in understanding understanding as a conceptual web?

Our investment is not entirely lost. Remember, understanding according to the performative interpretation (an understanding performance) is thinking with knowledge. Knowledge consists of conceptual webs one stores in the mind or, in cognitivists' language, in long term memory. And the better, the more densely woven your webs are, the better your understanding performances. In other words, there is an intimate and integral connection between knowledge and understanding, conceptual webs and understanding performance. The conceptual webs, the knowledge, that one preserves is one's mind is the foundation of the individual's actual and potential understanding performances.

But it should be admitted that there is "a world war" in the last decades between these two concepts of understanding – understanding as a web, as a conceptual representation of the world, and understanding as a performance done without conceptual representations in mind. We don't have to take a side in this argument. We may claim that these two theories of understanding are effective when they are unified in an overall theory or as separated theories, just like in quantum theory you may grasp quantum once as waves once as particles.

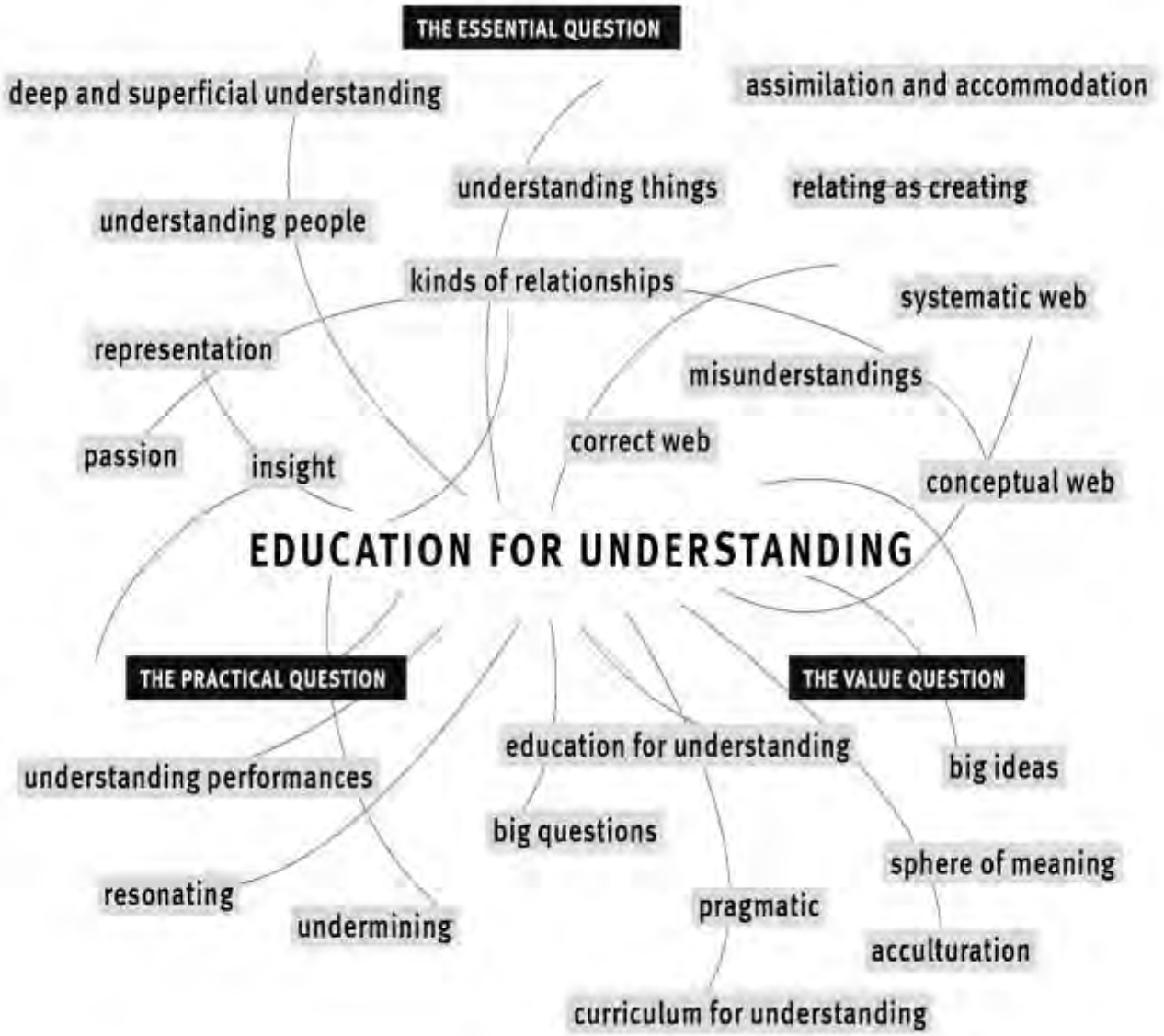
Well, let's take this all into the classroom.

We can suggest seven very general directions in preparation for, during, and at the end of the lesson for understanding:

1. Formulate a very big idea you want your students to understand, or formulate the main goal of your teaching in terms of a very big idea, and divide it into several subordinate big ideas;
2. Extract from the very big idea a very big question and divide it into several subordinate big questions;
3. Base your lessons on big questions leading to big ideas; undermine and resonate;
4. Anticipate before the lesson and spot during the lesson personal and class understandings and misunderstandings, and address them persistently and systematically;
5. Direct your students to understanding performances and provide feedback accordingly;
6. Give your students understanding, challenging assignments and assess them on the quality of understanding performances; and,
7. Design and mold a culture of searching for understanding in your classroom (through modeling, explanations, interaction, and feedback).

We need to provide more detailed directions, but avoid too much design for understanding. Understanding, as we said, is creating, and creating calls for freedom, spontaneity, and improvisation. And since understanding is creating done in each individual mind, we cannot generate it directly but, rather, furnish conditions that will maximize its prospects both inside and outside school. We need a whole village to educate for understanding.

Well, I think I begin to understand what teaching for understanding is all about. We may conclude our conversation …



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About the Author

Prof. Yoram Harpaz is a senior lecture in Beit Berl College in Israel. He was a teacher in a High School, a journalist, a project manager in Branco Weiss Institute for the Development of Thinking, and the Director of Mandel School for Educational Leadership. He wrote his dissertation in Harvard University and The Hebrew Universality. He published five books in Hebrew, two in English (*Teaching and Learning in a Community of Thinking: The Third Model*, Springer, 2014; *Designing Educational Environment: The Guide*, in press), and many articles (most of them in Hebrew) about the aims of education, teaching and learning and teaching thinking.

e-Mail: yorhar1@gmail.com