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# Deep Understanding for All Students

*The Overriding Goal for Schooling*

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We root our case for deep understanding as the overarching goal of public schooling in six straightforward claims.

1. Many specific facts have a very short half-life.
2. You can have your cake and eat it too (or you don't need to trade off good test results).
3. The experience of deeply understanding something encourages further learning.
4. Most real-life tasks require serious, self-directed problem solving.
5. The broader context of our lives places a premium on deep understanding for survival.
6. The alternatives are not very compelling . . . If not deep understanding, then what?

## OUR CASE FOR DEEP UNDERSTANDING

Schools now live in a policy world populated, for example, by the No Child Left Behind Act, which requires schools to meet annual yearly performance targets, weeks of time consumed by student testing, a narrow focus on literacy and numeracy, the constant threat of school reconstitution if external achievement standards are not met, and a host of other demands for greater public accountability. In this world, deep understanding, on the face of it, seems an unlikely focus for teaching and learning. Rather, the natural press would seem to be toward the achievement by students of ever more specific, explicit, and readily measured outcomes. This book is about why such a direction actually thwarts the aspirations most of us have for our children and what we can do about it. It aims to arm teachers, school and district administrators, teacher union staff, teacher educators, and parents with the knowledge needed to foster deep understanding among students on a large scale.

Our motivation for developing this research partnership was the conviction that deep understanding for all students ought to be—but is not currently—the overriding goal for public schooling. Deep understanding seems like such an obvious purpose for education that, at first blush, making a case for it, as we do in this book, may seem unnecessary. All teachers assume that students' understanding (depth aside) is the purpose of their instruction—certainly, none would claim to be teaching for misunderstanding or shallow understanding.

Whether assumed and obvious or not, there are overwhelming indications that, at all but the most advanced levels of education, deep understanding is rarely achieved by most students. Many of our own adult students, for example, have told us that until they became immersed in their doctoral research, formal education had simply expanded their superficial understanding of an increasing amount of codified knowledge in their chosen fields of study.

### The North American Curriculum

It is often said that the purposes of schools are unclear and often contested, in spite of an official curriculum in most states and provinces literally teeming with things to be "covered." This only goes to illustrate, once again, the difficulty of seeing the forest when one is constantly required to focus on the trees.

The Canadian province of Ontario, the context in which we did this work, shares with many states and provinces a similar orientation to accountability. A key feature

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of this orientation is the proliferation of expectations or standards to be met by students. Their sheer number makes it extremely difficult either to discern the overall image of an educated person in any holistic way or to achieve deep understanding in relation to any one of them. "More is less" when deep understanding is the goal. Using the Ontario curriculum as a case in point, by the end of the eighth grade, elementary school students

are intended to encounter, learn, or otherwise come to grips with a total of 3,993 specific expectations (we counted)! On average, there are about 500 specific expectations

for each grade until Grades 7 and 8, where specific expectations jump significantly (to 584 and 586 in Grades 7 and 8 respectively).<sup>1</sup>

If the school day averages five hours and the school year 190 days, students have about 950 hours to meet about 500 specific expectations, or about 1.9 hours for each expectation, at least theoretically. Of course, not all five hours of each day in an elementary school is focused on the curriculum.<sup>2</sup> So the real time per expectation is probably closer to 1.5 hours. From a teacher's perspective, this means 1.5 hours to ensure that all 25 to 35 students in one's class master each expectation, roughly 3 minutes per student. Seems a bit tight, doesn't it?

The curriculum for many North American school systems has often been described as "a mile wide and an inch deep." Small wonder.

In this book, we provide some perspective on the forest that is the North American curriculum. We describe what it feels like to be a teacher shepherding one's students through this forest. Suffice it to say, for the moment, that there is quite a lot of prickly and annoying underbrush to cut through to make much progress with one's charges. And before we dismiss such annoyance as trivial, we should remind ourselves of the central role that student welfare plays in the job satisfaction of our best teachers.<sup>3</sup> If teachers are annoyed and dissatisfied with the curriculum, we should be concerned about the value of that curriculum for our children.

## THE CASE FOR DEEP UNDERSTANDING

Arguments about the purposes of schooling are often couched in either highly philosophical or ideological frameworks. We think that neither approach is actually very helpful for engaging a large proportion of either professional educators or policy-makers, not to mention the public. So instead, we root our case for deep understanding as the overarching goal for public schooling in six straightforward claims.

### Many Specific Facts Have a Very Short Half-Life

It's hardly news that what we hold to be true is always evolving, so we don't think this claim requires much defense. Regarding the physical world, for example, while what we observe directly may seem undeniably factual, our explanations for what we observe and how things got to be that way have gone through at least several paradigm shifts in the space of most of our lifetimes. In the medical world,

<sup>1</sup>The Ministry of Education is currently reviewing the curriculum. The Social Studies/History and Geography curriculum has been revised and is being implemented in 2005–06. However, the expectations have been reduced only slightly; some of the expectations have been combined; and many of the concerns expressed by elementary teachers were not incorporated into the revisions.

<sup>2</sup>There are, for example, snow suits to be contended with, voluntary activities such as Jump-Rope-for-Heart, bomb threats to be dealt with, upset students who require the immediate and full attention of the teacher, bus delays, and so on.

<sup>3</sup>See, for example, Desimone and Le Floch (2004).

recommended treatments for many illnesses change every decade at least in response to rapidly changing understandings about how the body works. As an example from the social sciences, dominant explanations for how people learn have shifted quite fundamentally as behavioristic, information processing, and social constructionist theories have gained and then waned in support among learning theorists; "brain research" has begun to dominate many people's beliefs about how learning occurs. Even our understanding of historical "facts" changes as we adopt different lenses on the past.

That said, some would argue that there is a corpus of facts and concepts that children should master if they are to participate in the human conversation. Advocates of this view, perhaps most notably Hirsch (1987), go so far as to list these facts and argue for their inclusion in the curriculum. Adopting deep understanding as an overriding goal for education does not come into conflict with this position as directly as might seem to be the case. After all, the recommended corpus of facts and concepts likely does dominate the conceptual starting points that many people share in order to unpack the meaning of their present experiences. Furthermore, the curriculum must have some subject matter to understand. But when deep understanding is the goal, subject matter is the stimulus for thought and exploration—not just the facts to be memorized.

### **You Can Have Your Cake and Eat It Too (or You Don't Need to Trade Off Good Test Results)**

For those attracted to a curriculum that emphasizes the mastery of predetermined knowledge and skills, adopting deep understanding as an overriding goal for schools should be particularly compelling. Growing evidence suggests that students benefit from a curriculum that fosters deep understanding; they perform at least as well as and sometimes better than students not so exposed on the tests typically used to assess student progress and hold schools accountable for student performance.

This claim has received support in several recent analyses—see, for example, Weglinsky's (2004) analysis of evidence from both the U.S. National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS). Both sets of data allow for the comparison of student performance on basic skills with performance on critical thinking, higher order thinking skills, and other outcomes associated with understanding. As well, both sets of data provide information about the forms of instruction used by teachers. Across most subjects, both sets of data associate better student performance with forms of instruction that emphasize deep understanding.

A review of evidence from TIMSS, as well as a half dozen other sources, came to a similar conclusion (Tighe, Seif, & Wiggins, 2004). And Ross and McDougall (see Chapter 5 of this volume) conclude from their review of a wide array of additional evidence about mathematics achievement:

You would expect that students who were taught in traditional ways would do better on traditional objectives, but this is not the way it turns out. In most studies of this type, students who have been taught using the deep understanding approach do better on traditional tests than students who were taught using traditional methods. (p. 36)

## **The Experience of Deeply Understanding Something Encourages Further Learning**

Indeed, with subject matter that is sequential, as in the case of mathematics and some of the sciences, failure to understand prior concepts dramatically reduces a student's ability to come to grips with more complex concepts, the understanding of which depends on those prior concepts.

We also know that one of the strongest motivations for further learning is a sense of success with prior learning. The sense of self-efficacy derived from the experience of success in one's prior learning tasks (e.g., Bandura, 1986) is a central source of motivation and commitment for further learning. Conversely, having only opportunities for superficial understanding robs the student of the satisfaction of insight, thereby diminishing commitment to continue learning.

## **Most Real-Life Tasks Require Serious, Self-Directed Problem Solving**

Although this seems pretty self-evident, we offer a couple of examples to demonstrate the range of this claim. First, the case of Mom and Dad (M & D) and their 13-month-old baby, who is crying loudly at 3 a.m. Thirteen-month-olds don't tell you what's wrong with them. But if you are M & D, stopping the crying soon is definitely one of your short-term objectives. M & D define the problem as "some sort of physical or psychological distress that needs to be alleviated." Nonetheless, they do not have access to an effective and ready-made solution; they have to use what they know—or can find out pretty quickly—to create a solution. In this case, the relevant "domain" knowledge includes something about early childhood development, the signs of teething, possible lactate allergies, and the like. It also includes what they know about the causes of their son acting in this way in the past and their sensitivity to his emotional states. Out of this knowledge, they have to craft and try out a solution, which, if it doesn't work, will need revision and more trial. Dr. Spock's advice can come up short pretty fast in such cases.

The second case is the service adviser at your local car dealership. A customer drives in claiming that there is something wrong with the steering mechanism in her car. The adviser has choices. He could just write up the work order telling the mechanic to fix the steering mechanism, but he knows that 8 times out of 10, the symptoms described by the customer are caused by poor wheel alignment. If he writes up the work order focused on the steering mechanism, the mechanic and the shop will make more money because the customer will be charged for the time it takes, first, to rule out the steering mechanism and then to repair the wheel alignment. In this case, the service adviser walks out to the car and checks himself for uneven tire wear, a sure sign of misaligned wheels. This costs the customer nothing and points the mechanic at the real problem immediately.

Note that both of these example problems are common, require application of quite specific knowledge without which an effective solution is unlikely, and are to be found in both real-life personal and work contexts. Note, as well, that the second example—seemingly mundane and eminently practical—illustrates an ethical dimension to human problem solving. Finally, these cases demonstrate that deep understanding is not only about specific areas of knowledge but also about

problem-solving processes themselves, including what is sometimes referred to as meta-cognition, an understanding of one's own thought processes.

### **The Broader Context of Our Lives Places a Premium on Deep Understanding for Survival**

This claim is a direct extension of the previous one. Our daily lives routinely demand sophisticated problem solving, and our current point in social history places a premium on the possession of intellectual capital. We are constantly reminded that we now live in a knowledge society fueled by a global economy where intellectual capital is the competitive edge needed to survive and prosper. Furthermore—economics aside—most of us are confronted daily with personal and social challenges made increasingly complex by the increasingly diverse communities in which we live, the changing nature of family structures, and the sheer speed of social change, among many other things. Finding personal meaning in our lives depends on our ability to better understand this context and our preferred roles in it; being successful in doing this, on our own terms, depends on the habits of mind and other internal resources we have developed in part, at least, through our formal education. Deep understanding is crucial in meeting this challenge.

### **The Alternatives Are Not Very Compelling . . . If Not Deep Understanding, Then What?**

If not deep understanding, then what? We know all too well the answer to this question, an answer foreshadowed in our previous claim. It is a superficial grasp of many themes, ideas, and topics, an outcome that serves our thinking and problem solving poorly. Consider the common experience of "cramming" these things into our brains before the big exam. Think about the residue left 24 hours later; perhaps something useful for subsequent games of Trivial Pursuit, but not a lot more.

Our assertion that deep understanding ought to be the goal of education for all students is likely more controversial than the importance we attribute to deep understanding alone.

It is not too much of a stretch to argue that tripping across the top of many topics and ideas, as is fairly common in our schools, not only bores our students to death and deskills our teachers; it also is one of the most scandalous squanderings of scarce public resources we can think of. This feature of our curricula may be to blame

for a large proportion of the overwhelming sense of boredom with school expressed by high school students (Olson, 2005).

### **Why All Students?**

Our assertion that deep understanding ought to be the goal of education for all students is likely more controversial than the importance we attribute to deep understanding alone. At least until very recently, our culture implicitly reserved the intention of deep understanding as a goal for only the most academically inclined students.

However, a key explicit value for most North American school systems is equity, a value which suggests that if deep understanding is important for some

students, it ought to be important for all. The most practical form of the question Why all students? is really Why not? What reasons are usually given for not achieving, or not trying to achieve, deep understanding for all students? Can these reasons be justified?

The two most common reasons are that (a) only some students are capable of developing deep understanding and (b) only some students actually need it. In response to the first of these reasons, we have a substantial body of evidence, some of it quite old (e.g., Bloom, 1981), demonstrating that a very high percentage of students are capable of mastering advanced levels of knowledge given suitable educational experiences; in this case, *suitable* means experiences designed in response to their interests, time required for learning, prior knowledge, and ways of processing new information. As to the second reason, the pervasive requirements for problem solving in both personal and work lives indicates, at least to us, that all students actually need deep understanding of a range of topics in the curriculum.

### What Next?

In this chapter, we have argued the case for deep understanding among all children as the overriding goal for public schooling. We have also begun to demonstrate why some features of the typical North American curriculum are not helpful in realizing this goal for many children.

The remainder of the monograph

- Provides a rich and varied set of insights from theory and research about how to foster students' deep understanding in the classroom, both in and across the curriculum
- Describes what teaching for deep understanding looks like through illustrative examples, focusing on some subject areas and some cross-curricular teaching goals
- Reports new evidence from a large sample of elementary school teachers about their efforts to help their students develop deep understanding and the conditions that either contribute to or hinder such efforts
- Exposes many of the systemic obstacles that need to be addressed if this goal is to be more fully realized on a large scale
- Offers recommendations for better achieving this goal, recommendations aimed at everyone with a stake in our schools, from teachers, school and district administrators, and faculties of education through to policymakers

As the following chapters make clear, we know quite a lot about how children acquire deep understanding and what can be done to foster it. In one form or another, this has been a sustained focus of research for several decades. It is time we put that research to better use.

Many different people are in a position to help with this task—in fact, are necessary supports to ensure that teaching for deep understanding is a reality. This is why this book is intended for a wide audience—for teachers, principals, district administrators, teacher union staff, university-based teacher educators, and others. As a result, we know that readers will likely come to the book with a stronger knowledge

**10** THE SIGNIFICANCE AND MEANING OF "DEEP UNDERSTANDING"

and interest in some chapters than in others—but we encourage reading across the whole book to understand teaching for deep understanding in a *systemic* way. While some chapters may seem more conceptual than concrete, it is important for readers to sit with and try to absorb the concepts: This is exactly what deep understanding is all about.

**Our Agenda**

As this overview suggests, our longer term agenda is to prompt action at all levels of the school system. While we are critical of many features of the typical elementary school curriculum, both the intended and the delivered curricula are what concerns us. So responsibility for action, we argue, is widely distributed throughout the system.

State governments, for example, have the responsibility to reshape and align curricula and related policies to encourage a focus on deep understanding for all students. Parents are responsible for giving thoughtful consideration to the importance of deep understanding as a central educational goal, even when accomplishing that goal means engaging their children in educational experiences unlike those they experienced as students themselves. District and school administrators will need to revise and realign their management processes in support of teaching and learning that develops deep understanding among all students. And many teachers will need to invest in the further development of their own content knowledge and pedagogical skill. Unless these distributed responsibilities are assumed in significant degree, the chances of all of our children achieving deep understanding through their school experiences are much reduced.

Education is viewed as a top priority for reform across North America. But many reform initiatives hope to foster greater achievement through a focus on such issues as class and school size, school structure, organizational culture, educational governance, and funding. These are important features to address but only when they play supporting roles to more fundamental changes in the core technology of schools: teaching and learning. Furthermore, many current efforts aimed at fundamental changes in the core technology of schooling are highly prescriptive, one-size-fits-all solutions, such as the Comprehensive School Reform (CSR) models.

In spite of the widespread attention CSR models have attracted in districts and schools and the favor they enjoy in policy circles, empirical evidence of their success remains spotty at best from the perspective of all but the most committed advocates. Assisting schools to focus much more of their attention on teaching for deep understanding should be viewed as an alternative to adopting one of the CSR models, or, perhaps more productively, an initiative to be pursued in combination with implementing one or more of the CSR models.