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On Creativity and Thinking Skills: A Conversation with David Perkins

A major contributor to Venezuela's Project Intelligence and author of several books on creativity and thinking, including *The Mind's Best Work*, David Perkins is codirector of Harvard's Project Zero. Highly regarded for his broad knowledge of this complex and developing field, Perkins is concerned with cognitive skills and human development, especially in the arts.

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To what extent is the current interest in teaching thinking a worldwide movement?

It is certainly apparent in a number of countries. For example, in the early 1980s, the government of Venezuela launched a number of programs to foster the development of thinking skills—not only in school children but in citizens of all ages. Some of the materials for that effort—Project Intelligence—have now been published in English under the title of Odyssey: A Curriculum for Thinking. We evaluated Odyssey in Venezuela with quite positive results on the summative evaluation.[1]

What was your role in the Venezuela project?

I was a member of the curriculum writing team. I wrote the unit on inventive thinking with the collaboration of my colleague, Catalina Laserna. I also did a certain amount of work on teacher training and course evaluation. I made a number of trips to Venezuela, worked with the teachers, observed classes, things of that character.

Your office here at Harvard is called Project Zero. Why?

Well, Project Zero was originally founded by a Harvard philosopher, Nelson Goodman, in 1967. He hoped to better understand the philosophy and psychology of the arts in order to make recommendations for the improvement of arts education. Since then, the project has broadened out considerably. While still working on the arts, now we encompass a number of other interests having to do with cognitive skills and human development.

Anyway, at the time, Nelson's estimate of the state of *general communicable* knowledge about arts education was zero, so that's what he called the project. And we have lived with the name with some agony and some amusement.

Would you say that the state of knowledge is somewhat above zero now?

Yes, I think it is.

What have you learned about creativity that wasn't common knowledge earlier?

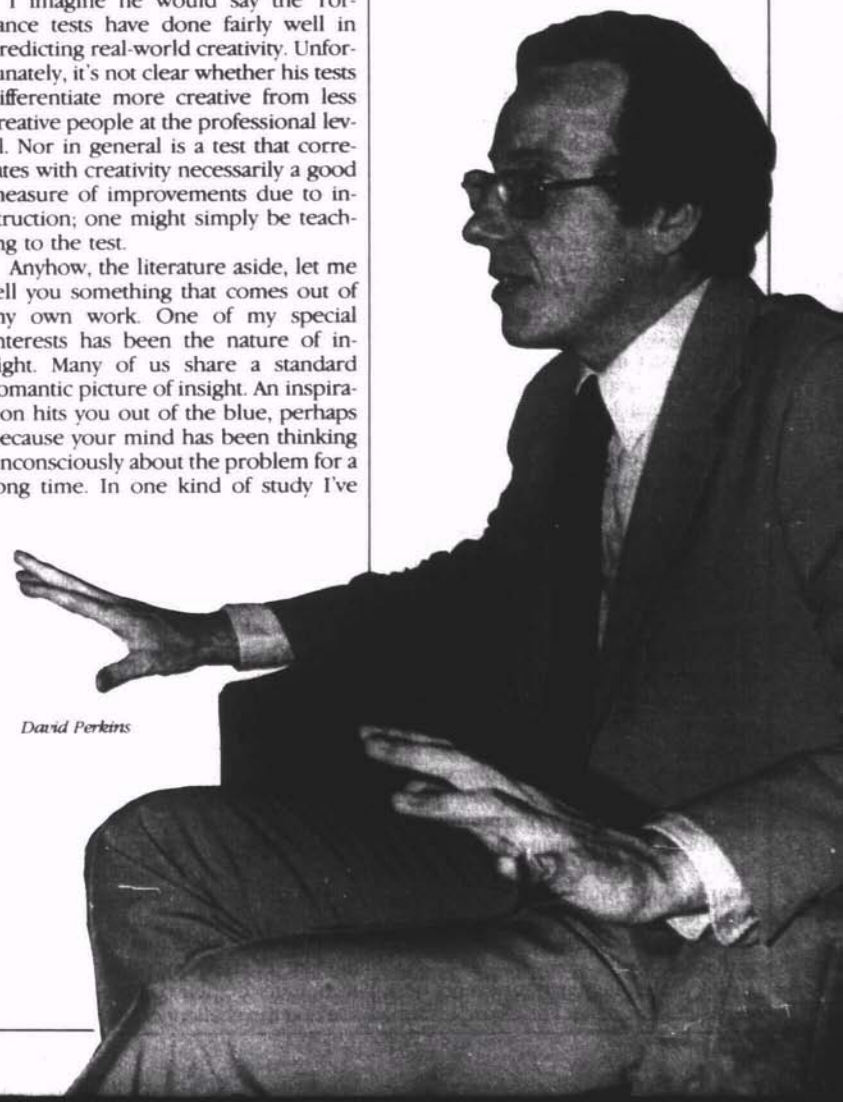
One important thing that I have learned from synthesizing the literature relates to testing creativity. Tests of creativity generally call for "ideational fluency"; they ask you to generate lots of ideas and they rate you on the quality and number of those ideas. Unfortunately, performance on that kind of test does not seem to have much to do with real creativity. People of demonstrated creativity, people who are acknowledged by their peers as being among the more creative members of their profession, do not necessarily score high on measures of ideational fluency.

This may seem a minor matter, but it's fairly important, not only because it affects how you measure creativity in students or employees but because it limits the validity of research. I often read in research journals about somebody trying to teach creativity and measuring the results with a test of ideational fluency. Every time I see that, I throw up my hands and say, "Here's a study that could have told us something we might rely on, but because an unreliable instrument was used, we really don't know whether the author has proven something or not."

The best known creativity tests are probably the Torrance Tests of Creative Thinking.[2] Surely Torrance would argue with what you have said, wouldn't he? What would he say?

I imagine he would say the Torrance tests have done fairly well in predicting real-world creativity. Unfortunately, it's not clear whether his tests differentiate more creative from less creative people at the professional level. Nor in general is a test that correlates with creativity necessarily a good measure of improvements due to instruction; one might simply be teaching to the test.

Anyhow, the literature aside, let me tell you something that comes out of my own work. One of my special interests has been the nature of insight. Many of us share a standard romantic picture of insight. An inspiration hits you out of the blue, perhaps because your mind has been thinking unconsciously about the problem for a long time. In one kind of study I've done, you catch people right after an insight and debrief them. You ask them about their chain of thought: what happened over the past five or



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ten seconds that led up to the insight. Interestingly enough, you almost always find a chain of thought.

I came to the conclusion that what seems to come suddenly doesn't come as suddenly as it seems. Typically it's provoked by some object accidentally in the environment or some mental wandering you've been doing that sets your mind along a certain track. In five or ten steps you arrive at an insight and are surprised and delighted by it. But you forget about the five or ten steps.

And yet those steps are relatively fast?

Yes, relatively.

In other words, a computer can operate very quickly but lots of things can go on in that short space of time. Is that what you're saying?

I'm saying it isn't some kind of magic. If you look at the steps that might have led from Darwin's reading of Malthus to his insight about natural selection, you find that each step makes sense. Wallace, who discovered the same principle some years after Darwin and also upon reading Malthus, actually spells out his mental steps. Again, each step makes sense. That doesn't mean that each step is a deductive step—we aren't talking about formal logic—but each step is discernibly connected to the previous step, not a leap, not something arriving out of the blue.

Are you suggesting there isn't any unconscious thought?

That needs to be said carefully. I argue that there is no *extended unconscious* thinking.

There's no question that the moment-to-moment life of the mind is largely unconscious. Our digestion goes on, our breathing goes on, and large parts of our higher-level mental functioning are also plainly unconscious. One of the easiest examples is remembering your phone number. If I ask you for your phone number, the answer pops into your head. Now, clearly, your mind has to do something to retrieve that number—to do a good deal, no doubt—but none of that activity shows.

But we're talking about events on a very different scale. For example, suppose you are trying to solve a math problem. You might imagine that you could come up with the answer after having worked unconsciously on it for hours, much as you would work on it consciously. That's what I mean by extended unconscious thinking. And that's what I claim doesn't occur. When it *seems* to happen, short conscious chains of thought that happen quite rapidly really account for the sudden emergence of a solution.

So one of the things your research is showing is that creativity is not some peculiar gift or mysterious process, but something that can be understood in terms of familiar experience.

That's my broadest position in *The Mind's Best Work*,[3] my book on creativity published in 1981.

I suppose there is no single point more important than the one you just highlighted. If you look to the kinds of mental operations that seem to figure in creative thinking, you can virtually always find analogies for these operations in more mundane thinking. You find, for instance, that often a creative insight occurs by recognizing a pattern or by remembering something. Now, not every process of remembering is creative, of course, but the ones that are creative seem to come about by way of the same psychological mechanisms as the ones that are not.

Okay, it's fair to ask, if the mechanisms aren't different, what is different? Why are these moments of remembering creative and those others not so creative? The difference ties in intentionality: in what one asks one's mind to do. If I'm a poet and I am trying to draw from my memory a good word to use, I probably ask myself to remember an interesting word, a word with a twist, not something straight. And my memory obliges. In general, creative people call upon their minds with questions different from those less creative people ask of themselves.

This is very clear, for instance, when one looks into the biographies of scientists who've proven themselves creative. They often quite deliberately seek out a problem that is a little off to the side of the conventional topics or techniques of their colleagues. They're seeking the challenges, the interesting possibilities. The romantic image of creativity is that it bubbles up or blossoms out spontaneously. But biographical data suggest that a lot of creativity comes about because that's what the person is trying to do.

You contend that creativity is not an ability. What is it, then?

I like to say it's a style—a way of deploying one's abilities. We've just talked about one way of deploying those abilities: the creative person asks of his or her abilities that they operate in certain directions. Another very good example is problem finding. Creative people tend to be less solution-minded than noncreative people. They think hard not just about what the answer is to the problem they already have or that somebody gave them, but what the problem should be: how the problem might be formulated, how it might be reformulated. They think about whether the problem is worth addressing or whether they should be addressing some other problem instead—because the other problem gives them more leverage, because it's more provocative, or because it cuts in a more interesting direction. Here again we find in the creative person a different pattern of attention and intention—a distinctive style of deploying one's abilities.

All this relates to personality, in the most conventional sense of psychometric personality measures. Creative people tend to be more individualistic on personality measures. I spoke earlier about ideational fluency measures. Interestingly enough, personality measures detect truly creative individuals with considerably more reliability than do ideational fluency measures.

Then there *are* measures researchers can use to determine whether certain kinds of experiences have contributed to development of creativity?

Yes, we could use personality measures—but the best measure is one's track record. A person's history of creative activities, or uncreative activities, is the best predictor of whether the person will be creative in a certain area in the future. This is documented in the literature. So, ideally, if we want to find out about the impact of, let's say, a creativity course, we ought to track people who took the program

and see what they do compared with a control group who didn't take the program. Now, that is difficult to do, and it almost never happens, but it would be the ideal scenario.

As to the content of such programs—the experiences themselves—what have we found out about what schools can do to develop, or at least encourage, creativity?

If you're talking about hard evidence, we've found out surprisingly little. One of the principal reasons for this is the questionable validity of the most popular instruments for measuring creativity. It's been clearly demonstrated that programs of instruction can improve people's performance on these measures, but we don't know whether people who have learned to score higher on such tests behave more creatively in the real world. The courses that improve performance on creativity tests *may* also improve people's real creativity, but in terms of hard evidence, we don't know.

Now, let me talk about somewhat more specialized situations. There is very clear evidence in the literature that mathematical problem-solving skills can be improved. An experiment done by Allan Schoenfeld,[4] for example, got very strong improvements. As part of the Venezuela project, we did some post-testing on inventive thinking abilities on a design task. I should say that the unit on inventive thinking was organized around the notion of "design." We found that on a simple design activity—designing a table for a very small apartment—the treatment group did far better than the control group. I like that kind of task because it has ecological validity. I like Schoenfeld's mathematical problem-solving tasks for the same reason. Both test learners by asking them to do the sorts of tasks you want them to learn to do, rather than tasks that have little ecological validity.

There must be a couple of other cases like these around, although none come to mind immediately. So there are positive signs here and there, most of it in work done since the heyday of measuring ideational fluency. But we would know a lot more at this point were it not for the problem of these ideational fluency instruments.

"The romantic image of creativity is that it bubbles up or blossoms out spontaneously. But . . . a lot of creativity comes about because that's what a person is trying to do."

Your idea of "creativity by design,"[5] then, comes from your study of this field and your feeling that a design approach is probably one of the better ways for schools to encourage creativity in their students.

I came up with that when we were planning a unit on inventive thinking for Odyssey. Design is a powerful concept. In the first place, creativity involves creative products. Whether it's a pun you make on the spur of the moment, or a painting, or the theory of relativity, you can think of that product as a humanly created design—that is, something with a particular structure adapted to its intended purpose.

We can think about both concrete and abstract things as designs. For example, a pencil is designed with a certain structure organized to serve well a certain purpose. But you can also think of the Pythagorean theorem as a design. You can ask about it the same kinds of questions you might ask about a pencil: What purpose is it supposed to serve? Why is it designed this way? Why not some other way?

Thus, there's enormous opportunity in the concept of design to bridge from talking about concrete things like pencils and paper clips to more abstract things like processes: shopping in the supermarket, for instance, or the algorithm for long division, or computer programs. The same holds for constructive as well as analytical activities. You can bridge from designing a highly portable chair to more abstract inventive tasks such as designing a law. Laws are a good example of design because they're so calculatedly worked over to serve certain social purposes. Or to designing a theory. Another richness in the concept of design is that it can bridge across disciplines; one can talk about the design of a poem or the design of an equation. In my *Knowledge as Design*,[6] appearing this spring, I try to detail how instruction can be reframed by the concept of design.

Design certainly goes far beyond the arts.

Far beyond. It's good not only for talking about creative thinking but for critical thinking. An argument, for instance, is a design; it's a kind of truth-testing machine.

We hear more and more about critical thinking these days. How do you relate critical thinking to creative thinking? Do they have similar attributes, or are they quite different? Do you find them in the same individuals, or do some people do one better than the other?

From a philosophical standpoint, the two can't be clearly separated. The creative thinker has to be critically aware, because creative thinking, except in the simplest situations, involves the generation and sifting of possibilities and reworking them. That has to be a critical process.

I've noticed that you stress the objectivity of creative people, and objectivity is certainly one of the qualities of the critical thinker.

Absolutely. And if you're talking about really good critical thinking, you're talking about thinking that is insightful. It's not just nitpicking; it cuts to the heart of the matter—and that, rather plainly, is creative thinking. So, from a philosophical point, one has to acknowledge that the two are hand-in-glove and it can't be any other way.

On the other hand, one can acknowledge that and still talk in terms of balance or emphasis. People produce a lot of products of one sort or another. Some of those products are what you might call *primary* products:

things like paintings, poems, movies, and theories. Some of them are what you might call *critical* products: critical reviews of, or examinations of, the primary products. The better critical products are themselves creative; they represent profound insight into the nature of the primary products. Nevertheless, some people have more of a flair in one direction and some in the other.

The kinds of dispositions and abilities that Robert Ennis talks about as characteristics of critical thinkers might or might not be found, I suppose, in a person who produces the most creative designs. We just don't know, do we?

No, we don't, and there's a good reason why the question is up in the air not only empirically but conceptually. There's critical thinking and critical thinking, you might say. A fair amount of critical thinking has to do with the soundness of propositions and the sorts of grounds one advances for propositions. Now, some areas of creative work are rather propositional, and some aren't.

Let's take psychology, for example. You advance a theory in psychology and try to do experiments to prove it. Part of your competence is to be fairly handy with the sorts of arguments that provide the checks and balances for psychological theorizing. So I don't think it's very likely that in psychology one would find a person of acknowledged great creativity who is just plain bad at the critical side of things, because the evidence wouldn't be any good; the person wouldn't get into the journals and attain renown.

But let's take poetry writing or painting. These are not the sorts of fields in which one as handily tests the soundness of one's position by argumentation or by looking to see whether the evidence is there. So I could easily imagine there being a poet or painter of acknowledged creativity who was not very good at argumentative discourse.

Now, that doesn't mean that this person is not a critical thinker, but rather the critical thinking is very perceptual, very gestalt in character, very much oriented toward statements like—if one wants to put them into verbal terms—"That's too red; it shouldn't be as red as that," "That's too strong," or "That's not strong enough," or "That shouldn't be here, it would work better over here because the result is better balanced"—or "because the result is more interestingly unbalanced"—critical insights like that. Now, such judgments may or may not have some connection with extended, strongly verbal, critical discourse. I don't think I want to say they don't have anything to do with it, but it's just not clear that they do.

And in schools, where we want to develop both creative and critical thinkers, the kinds of experiences we might purposefully provide to do the one would not necessarily be the same as what we do for the other.

Yes. I think it's very important to work on argumentation and, in fact, a lot of my research—apart from the creativity work—concerns ability to handle arguments. But, ideally, I would work not only on argument but also on connoisseurship, where one heightens one's critical perceptions of things. We need to do both, although I admit I know a lot less about how to do the second than the first. We know more about argument and fostering discursive reasoning abilities than about how to foster the acute eye or the acute ear.

"The courses that improve performance on creativity tests *may* also improve people's real creativity, but in terms of hard evidence, we don't know."

What is the place of exercises like those in Odyssey in developing thinking skills? The exercises educators are used to are ordinarily related to subject matter of some sort. Some of the thinking skills materials—Instrumental Enrichment, SOI, Strategic Reasoning, and Odyssey—do not focus on content; they're intended to develop the mind so that it's prepared to deal with school content later on. Some people say that's not a good idea; we should teach thinking in the context of a subject-centered curriculum.

What we're really talking about here is the problem of transfer: in a program of instruction intended to foster thinking skills, the students do something; the question is what that has to do with the payoffs that may occur in real life and in the teaching of conventional subject matter.

One point is that, if some of these activities don't have much to do with what now happens in the classroom, maybe they should. For instance, one of the units in Odyssey is about decision making. Now, it's pretty clear why one should be a good decision maker, and there are all sorts of situations in real life in which one might benefit from knowing the sort of strategies taught in the decision-making unit. It so happens that conventional school performance may not benefit very much from decision-making skills because students are not expected to engage in making decisions very much as part of their academic programs. But I would say they should be.

The design sequence—the sequence on inventive thinking—is another example. Broadly speaking, life is conducted in terms of products and projects. We design things and engage in projects that yield things. Again, this is the sort of thinking that could well transfer to the classroom if students were doing those sorts of things—but in most classrooms they aren't.

Now let's talk about a different kind of connection. For some of the sorts of exercises you see in Odyssey and in other programs, such as Instrumental Enrichment, this isn't so. The activity is

not one you would spend a lot of time on in any everyday context.

For example, there are problems like "What will be the day after the day after tomorrow if the day before yesterday was Wednesday?" Now, that's not the sort of question you go about asking yourself in or out of classrooms. It is the kind of question, however, that pushes you to track very closely what you are doing: to break the problem into parts and approach it systematically.

So what? The research literature shows that there are difficulties in subject matter thinking and in real life or professional level thinking having to do with what you might call cognitive style: being precise, systematic, imaginative, and so on. Some people think that certain sorts of exercises, though lacking transparent connection with conventional subject areas, foster such styles of learning.

This is certainly the case with the work of Reuven Feuerstein.[7] It isn't that Feuerstein assumes that such skills will spontaneously transfer, but merely that they are best learned initially in sharply defined and isolated contexts. Then you shift them over to the application context by bridging activities intended to expedite transfer. Similarly, in at least some of the Odyssey lessons there are activities called "challenges," where the students are asked to take a strategy or process they have learned and plug it into an out-of-school context.

So you're saying that under the right circumstances these exercises could be valuable.

That's what I'm saying, but I'd also have to say that it's not really clear to what extent that's so. With Instrumental Enrichment you have the bridging, so, in a way, the question of spontaneous transfer doesn't arise. But I understand from talking to John Bransford and others that the bridging is often neglected, so by no means do you always get transfer from Feuerstein's materials. Likewise, there may not be enough bridging in some of the Odyssey materials. You give it a try, and hope the teachers are doing the bridging as you asked them to, and see what you get. Maybe in a decade we'll have a lot sharper sense of how much you have to work to ensure transfer. This is one of the fuzzy areas at the moment, although everyone agrees you have to do it.

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Some psychologists, particularly Robert Glaser,[8] contend that thinking ability is closely related to the level of one's specialized knowledge. They interpret that to mean that rather than offering separate thinking skills programs, schools should concentrate on teaching science and reading and mathematics in such ways that people learn to think better through those content areas. What comments do you have on that?

Well, that's one way to deal with transfer. By teaching thinking in context, you finesse the transfer problem. First of all, though, to Glaser—and to me—teaching those subjects well does not mean teaching them in the usual way. On the contrary, it means teaching with much more consciousness of the kind of thinking that needs to be done, and with much more engagement of the students in genuine problem solving, genuine inventive tasks, genuine critical appraisal, and so on. So what they, and I, have in mind in fact represents a considerable revision in teaching style.

Second is the issue of a stand-alone course versus integration of thinking skills with subject matters. Now, that's a very tricky issue for all sorts of reasons. First, it's not an either/or. Given the resources, you might do both—and both may be the best thing to do. Moreover, there's the issue of focused effort with big payoffs versus a broad spectrum approach with modest payoffs. One of the buzz words in the field of teaching thinking is the "power-generality trade-off." What that means is that very general strategies such as Edward de Bono's[9] heuristics, for instance, are unlikely to be extremely powerful in any one application, because an area such as mathematical problem solving or poetry writing has its special lore that is fine-tuned to that application. One reason for teaching a stand-alone course is that you may prefer modest payoffs across a whole range of subject matters. Then again, you may prefer depth rather than breadth, which favors integration.

Yet another issue has to do with the practicalities of the school setting. You can install a stand-alone course pretty easily; all you need is one teacher who's willing to teach it and has the flair and the time for it. There are many such courses around, and some of them seem pretty decent. But is a year's course enough? Integration gives you much more instructional time. But, changing the way a teacher teaches physics or English or history is quite a challenge. Teachers already have their habits of teaching their subjects in a certain way. These habits can be hard to change. You also face the momentum in the text itself and sometimes in the state-prescribed curriculum. You're also not talking any longer about one course that will be taught for two semesters in the first year of high school. Extensive integration with subject matters involves plurals: there are a lot of subject matters and several years of each to worry about. It's not quite clear how you get started on such a grand effort or how you see it through. In summary, there are arguments on both sides—for stand-alone courses and for integration. It's a complex issue that yields no easy resolution.

Recognizing these things, what would you say to a school principal who said, "I'd like to do a better job of teaching thinking skills in this school. How do I get started?"

That is a question I've been asked before, and I keep rethinking my answer. My recipe of the week might go something like this: the first and most important thing is to build up some excitement. Talk it around, have a seminar, circulate some readings.

You need interest on two fronts. You need interest among some teachers—not necessarily all the teachers, not even a majority, but at least a few—and you need commitment at the managerial level: superintendent, principals, curriculum coordinators, at least some of them have to really care. If they don't, an individual teacher may try something, but it will die on the vine or when that teacher leaves. The institutional commitment is most important, because there are always a fair number of teachers who are interested in this sort of thing.

Then the interested teachers and administrators should look at some things that have been done—not a lot, because too much has been tried. It is really self-defeating to wait until one has a sense of everything that has been attempted. Look at a few model cases. I would recommend, in fact, the book *The Teaching of Thinking*, which tries to summarize the state of the art and reviews a number of the existing programs.[10] I would also recommend ASCD's *Developing Minds*.[11]

Most important, don't just read and talk; try some things. Once people start to try things, they really get excited. Of course, that's when things start to go wrong, too, but that's what makes it interesting. There's no reason to expect to magically transform a school system in a short period of time; we all should recognize that and practice patience.

So where do you hope this movement is taking us?

Sometimes I like to put it this way: I hope it's a fruitful fad. It's clearly getting to be a bit of a fad. Now some fads come and go, and some fads settle in. A good example is the ecology fad. A few years ago it was a fad, but now it's part of the culture. You do not see as much protesting and rhetoric, but if you want to do *x*, *y*, or *z*, you had better think about the effects on the environment, because there's a general public consciousness about the problem.

I would like to see that happen with the teaching of thinking. I would like to see enough people concerned, enough school systems to have tried things, enough research to be done, enough policies in government acknowledging and supporting such efforts, that it becomes second nature that we're concerned with students' thinking. Sure, different people may be worrying about it in different ways, but that's okay; if it's part of the atmosphere, good things are likely to happen.

There's another scenario, however. Unless we hit what you might call a critical mass, unless enough people have enough success over the next five years, let's say, for it to be widely recognized that this is a worthwhile thing to do, it's likely to blow over, and we will be back where we were a decade ago. Now, it's not all that easy to foster thinking skills, and if a hundred ways are tried and only five of them really work well, it would be easy for the five to get lost in the noise. Unfortunately, right now most programs are underevaluated.

One difficulty is that the more complex, sophisticated, difficult, and expensive programs are not as widely used because they are hard to do.

That's a problem that should be taken very seriously by the field. In general, then, my hope is for a fruitful fad that matures, settles in, and stays around. I want to help that to happen. I know you and ASCD are working toward that. All of us working in the field need to invest ourselves. We need to *make* it happen.□

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