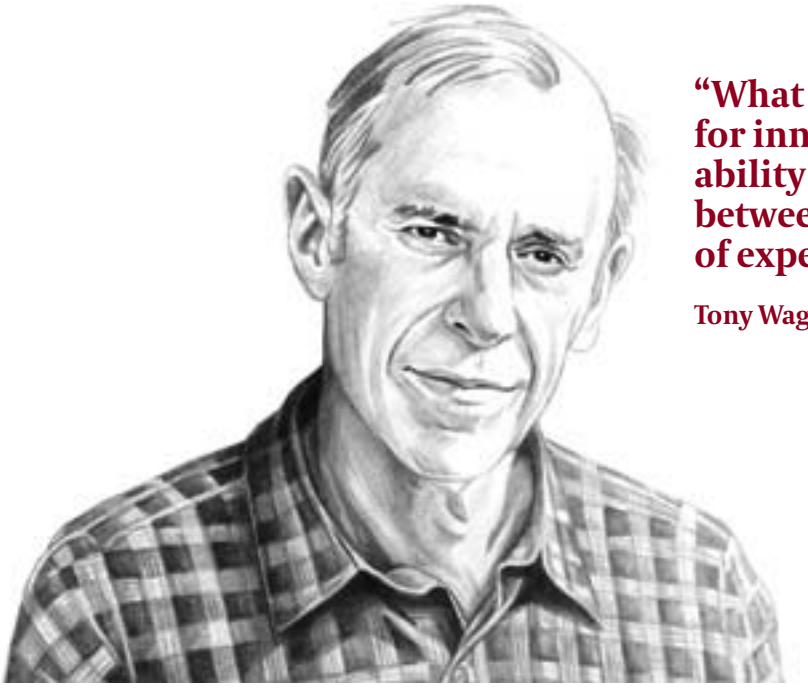

"What you really need for innovation is the ability to make connections between different kinds of expertise."

Tony Wagner

"We're all born curious, creative, and imaginative."

How can we make our education system fit for the challenges of the 21st century? Tony Wagner, educational innovator and 'thought leader', discusses with Ben Nelson of Minerva Project, a technology executive turned educational entrepreneur, the options and opportunities.

Tony Wagner has long promoted educational innovation through his books and work at Harvard University, while Ben Nelson is using his experience as an entrepreneur to pursue an ambitious project: his Minerva online university is aimed at creating a whole new model for education that will compete with the top universities. What these two men have in common is recognition that there is a disconnect between what universities are teaching and the leadership and innovation skills that underpin success in business today.

Tony Wagner: If we try to articulate what our children need to learn to be successful in tomorrow's world, then the first question we need to ask ourselves is what leadership skills are going to be most crucial. Two things immediately spring to my mind: creative problem solving, and a clear ethical framework. I think both of those are going to be essential to any future leader. How do you see it, Ben?

Ben Nelson: One thing that's going to become more and more important is a deep understanding of what expertise today is. When I look at great leaders, they all have a tremendous depth of understanding of their field and they've all been able to connect that understanding with other related fields.

Wagner: I agree that expertise is critical, but I also often see it as a blinder and even as a limiting factor, especially in academia. I read a story in the New York Times about a young woman who was trying to find a way of charging laptops wirelessly. She consulted all the experts in energy and physics, and everyone told her

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Ben Nelson

it wasn't possible, but she persevered on her own and acquired interdisciplinary expertise in related fields. And lo and behold! When she was just 21, she made a breakthrough and she's now an entrepreneur, running her own start-up. So I think what you really need for innovation is the ability to make connections between different kinds of expertise. We need greater expertise, yes, but we need it to be interdisciplinary, not focused exclusively on one tiny area of science.

Nelson: That's true, but we also have to be careful not to confuse interdiciplinarity with superficiality: the generalist who doesn't know much about anything but dabbles in lots of areas. Breakthroughs and innovation are mostly likely to occur at exactly that middle point between the generalist and the narrow-minded specialist, where you go into a discipline in depth, so that you know what being an expert means, but where you also have the ability to question other areas and integrate them in an interdisciplinary way.

Wagner: What interests me is how, where, and why we can best acquire expertise. I'm intrigued by the notion of just-in-time learning. For example, three years ago, I knew absolutely nothing about innovation and I really wanted to study it and understand it, but it was very daunting because there were so many related fields that I had no knowledge of. So I had to engage in just-in-time learning to enable me not just to acquire knowledge but also to do something with it – to translate it into its implications for education. I was deeply curious, and that drove my motivation. From my point of view, the static expertise offered by traditional academia generally doesn't serve society and its leaders well. By contrast, the motivation that comes from a problem-solving approach or from curiosity represents an entirely different reason for becoming an expert in something. So I'd put both curiosity and imagination right up there along with critical thinking, which implies the ability to ask really good questions. And of course we have to have communication in the mix, because if you have great ideas but you can't communicate them, then you're lost.

Nelson: What does that mean for our education and training systems, though? In the spectrum you mentioned, curiosity and imagination are probably the hardest to teach – perhaps even impossible to teach. I mean, there are plenty of techniques for motivating people, but if they aren't self-motivated – if they really don't have that internal hunger – then I doubt whether they can be taught to motivate themselves.

Wagner: I see it differently. As development psychologists never tire of telling us, we're all born curious, creative, and imaginative. The average four-year-old asks a hundred questions a day. But by the time that child is ten, he or she is much more likely to be concerned with getting the right answers for school than with asking good questions. I agree strongly with British educationalist Sir Kenneth Robinson: he suggests that schools and, sometimes, even parents knock all the curiosity, creativity, and imagination out of kids. So the question has to be: what can we as teachers and parents do to keep alive the curiosity and imagination that, to a greater or lesser extent, is innate in every child?

Nelson: Do you think they can get it back once it has been knocked out or educated out of them? Have you come up with some ways we can do that?

Wagner: Yes, I have. I've started encouraging educators to use the 'Google 20 percent rule' with their students: they tell them "For 20 percent of your time, you are going to be the architect of your own learning. We'll hold you accountable: you're going to create a digital portfolio, you're going to collect evidence of your progressive mastery of the skills that we think are the most important: critical thinking, collaboration, creative problem-solving, and

Illustrations: Uli Knörzer

Tony Wagner
is a proponent of transforming education to produce workers and leaders with the right skills for the 21st century. He recently became the first Innovation Education Fellow at Harvard's Technology & Entrepreneurship Center. Previously, he was the founder and co-director of the Change Leadership Group at the Harvard Graduate School of Education, where he earned both a master's degree and a doctorate. Earlier in his career, he worked as a high school teacher, K-8 principal, university professor in teacher education, and founding executive director of Educators for Social Responsibility. He has written numerous articles and five books, including his latest, *Creating Innovators: The Making of Young People Who Will Change The World.*

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communication." But students have to ask their own questions, they need to iterate and to reflect on what they've learned, what they haven't, and set new learning goals for themselves. Teachers who try this tell me they've been astounded as kids who seemed apathetic wake up and come alive. But some of the A-grade kids, who are used to jumping through hoops, tend to flounder a bit to start with, because the approach they've learned involves perfect compliance with the existing system.

Nelson: Well, that might work in schools, but I'm really not sure you could easily get universities to change the way they do things. Higher education has changed over the past few decades in ways that will be really difficult to reverse. In the past, universities had a philosophy on training for leadership – they gave their students a moral framework, critical thinking skills, analytical skills, things like that. In my view, that was the result of a rigid but broad curriculum: you learned your Greek and Latin, you read dead white men and all the rest of it. But then in the 1960s, or even a bit earlier, disciplinarity took hold: academia encouraged first the professors and then whole institutions to focus on extraordinarily narrow sub-specialties. And with the information explosion, a university education shifted to focusing on one discipline, the major, with a random smattering of other areas thrown into the mix. What higher education lost along the way was any concept of a curriculum. I don't agree with the great books philosophy, but I respect that it has a curricular perspective.

So if we want to rethink education, then one of the most critical things, in my opinion, is curricula: what meta-goals are we trying to achieve and how can we drive forward our students' intellectual development? Then we have to create a curriculum that supports that. But universities today aren't structured in a way that enables them to do so.

Wagner: I think increasingly that universities have not only to work out why they exist and what their critical outcomes are but also to reflect on what added value a teacher brings. Now that knowledge is a commodity and there is no real added value in knowing more than someone else because that knowledge is available to everyone, what's the role of a teacher in the 21st century? What's the purpose of going to school in the 21st century? Georgia Tech, for example, is about to offer a master's in computer science: it costs US$6,600, and the students don't even have to set foot on campus to get the qualification. For me, an effective teacher is a coach who coaches his or her students to a higher performance standard – and that's something that MOOCs (massive open online courses) haven't yet been able to crack.

Nelson: I very much hope that the Georgia Tech model is going to become much more widespread. As the technology starts to figure out how individual students learn better and what problem sets are going to help each individual student understand and internalize that knowledge, the model will become more effective – and cheaper. But this is a model that is particularly effective for knowledge mastery, not for broader intellectual development.

Wagner: The real issue, though, is whether the technology evolves to the point where it doesn't evaluate and promote understanding solely of explicit knowledge. As I said, the value of explicit knowledge is rapidly dropping to zero in today's world because it's commoditized. What about the much more important *implicit* knowledge? What about judgment? What about critical thinking?

Nelson: I agree with you: personal education will be almost exclusively focused on intellectual development. In many ways, Minerva is built for that world. We don't see our role as charging students money to certify that they have acquired knowledge: our role is strictly to ensure that students know how to apply the concepts they've acquired to more difficult questions. We think you can break critical thinking down into a set of 'habits of mind' – methods and concepts that you can actually teach students and then get them to apply to various scenarios and disciplines. We

Ben Nelson

holds a bachelor's degree in economics from the Wharton School at the University of Pennsylvania. He moved from a successful technology career into the educational realm to create, from scratch, the Minerva Project, a San Francisco-based for-profit that partnered with KGI to form the Minerva Schools at KGI (pending WASC approval), a reinvented university that will welcome its Founding Class in 2014. Minerva promotes itself as "a reinvented university experience for the brightest, most motivated students in the world." Its courses will emphasize complex problem-solving with real-world applications to help prepare students to be leaders and innovators across all disciplines. Nelson's former positions included serving as President of online photo hosting and printing service Snapfish and as Chairman of Redbeacon, a home maintenance website.

have a series of six underlying concepts that we want our students to take on board over their undergraduate career. The first is a core set of analytical tools that underpin critical analysis and creative thinking. The second is the concept of an extraordinary depth of understanding of what expertise is – not necessarily narrow-focus depth but depth in the sense of 'becoming an expert at something to understand deeply'. The third is a concept that we call 'non-surface breadth': if I approach a subject that's completely new to me, how do I approach it not to learn the basics but to interrogate that subject using just these core principles in an intelligent fashion? The fourth is understanding the community context of where you are; it is the ethical framework we want to deliver through exposure to culture. The fifth is the ability to integrate all those elements as the basis from which to make creative leaps. And the sixth is being able to take what you've created, communicate it to those around you, and get them to support what you are doing.

Wagner: If we're talking about transforming education, teacher training is the weak link. When it's done well, we know the results are spectacular. Take the case of Finland, for example, a country that's transformed itself from an underperforming rural-agrarian economy with a lousy education system to one of the most successful economies and one of the best education systems in the world. It did that by focusing relentlessly on radically upgrading the preparation and training, and even the selection, of its teachers. And that's really been the key to its success. I often find the quality of instruction appallingly low, even in our most elite institutions: that's partly because academics have a greater structural incentive to do research than to be a good teacher and partly because teachers tend to teach in the way they themselves were taught. They need to be coached to teach in very different ways.

Nelson: I think many teachers – at least in higher education – are really desperate for an opportunity to do that. We've gotten a tremendous response to Minerva from the academic community, even before we've started hiring our faculty. We expect to have biologists, economists, and philosophers, who will gravitate toward a particular college depending on their primary area of interest, but will be working in a very interdisciplinary way. We want to create intellectual communities that really transcend the traditional boundaries. One of the big aims of the technology we're using, and a major thrust of the curriculum and the faculty preparation that we're developing, is to develop brilliant outcomes from minds that may have been trained in too narrow a way up to this point.

Wagner: I think preparing all young people for an innovation economy will need a three-pronged approach – the 'three-legged stool' model. Of course, they'll continue to need content knowledge, but that's arguably the least important leg of the stool. They'll need skills and they'll need will or motivation. I'm fascinated that Minerva is focused primarily on the 'skills' and 'will' outcomes, with content knowledge being acquired as needed along the way. For far too long we've regarded schools, and particularly universities, primarily as vehicles for acquiring content knowledge rather than as places where you go to learn skills or develop motivation. That's now being turned on its head, as it should be.

Nelson: Whether you're dealing with a student who is extraordinarily well prepared or a student who is massively underperforming, the aim is the same: we need to get them to a point of hunger and excitement and motivation so that they can release their potential. But even being motivated doesn't mean that you know how to realize your potential. I found your example very telling: the A-students who didn't know what to do with the 20 percent free time to study on their own and the other, previously unmotivated, students who grab that opportunity. So our goal is to find some of the best raw material on the planet, harness the potential they represent, and activate it.

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