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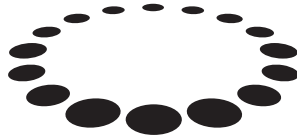# ON EDUCATION

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The Problem Solvers: from Teaching Students to Follow Instructions to Preparing Students to Identify and Solve Problems
Charles Leadbeater

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ON EDUCATION

The Problem Solvers: from Teaching Students to Follow Instructions to Preparing Students to Identify and Solve Problems
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Introduction

I want to say many things, but if I leave you with one thing it is that you have an amazing opportunity in Catalonia. You have an amazing opportunity at an incredible time for education to do something really significant, because I think there is a kind of new space opening up in education to do things in a new way that hasn't been there for quite a long time. Places like this which have a tradition of pedagogy which has elements of distinctiveness and different ideas, cultural identity at a kind of size which means that you can operate at scale, but it's not too big. Those things mean that you could really do something different and this, I think, is the situation that we find ourselves in in education.

That education is so critical, it's regarded as so important and yet it's so dysfunctional. It's so disappointing. There is so much failure in traditional education. That recognition of traditional system no matter how hard you push them will still fail very significant numbers of children and fail to equip even those children who do well for the world outside. That one response to this will be intensification. To intensify the system to make it work harder and make it work better. What I found when I was writing this and in much of my other work and you can download this for free from the Pearson Open Ideas website. What I found going around the world is that there is a kind of movement gathering pace to do things in a different way and people who want to do things in a different way aren't on their own and there are more people joining this.

One element of this movement really importantly is industry, employers and business, who think that education as it stands is not really equipping young people for the future of work, so they are an important voice because they bring a certain sort of political credibility. There are of course new people entering with new technology who bring elements of

innovation and change as well as other things as well, they are a new ingredient. There are academics, like Angela Duckworth writing about persistence or Carol Dweck writing about growth mindset, John Hattie's work, Tony Wagner's work at Harvard, opening up what education could become. And critically, all over the world, there are schools and practitioners who want to do things well and want to do things differently, but in a way that is rigorous and disciplined and they don't fall in to the false dichotomy or the false opposition of traditional knowledge, alternative, progressive. They are constantly blending these traditions and ways of seeing things and when you bring that together with the evident desire of students to want to do things in different ways and to learn in different ways and achieve things, then you have the makings of something that could be different.

This different thing, I think, will be away of learning which is both structured, evidenced, researched, thoughtful but which lent young people capabilities of collaboration, problem-solving, creativity, entrepreneurship which is what they are going to need for their future alongside skills and knowledge, but importantly those on their own won't be enough. That's the possibility and the possibility is that you can create these new ways of learning which would encourage this sense of collaborative creativity without them being labeled progressive or dismissed as being liberal, that actually they could be mainstream, they could be obvious, they could be a completely secure way of thinking about learning.

I just want to say why I think that's needed, what it might look like. Some of the examples that I have seen of schools including Col·legi Monserrat in Barcelona, who are doing elements of this and, critically, what you need to do and try and do that the level of entire community or system, not just in individual schools.

What are we learning for? How the world looks... forces of change

This is the question that we should be debating. Most of the time in education we don't do debate this question. Most of the time we debate how or what schools should be organized around or the length of the day or the nature of curriculum, but we very rarely discuss this what is it for? What's the purpose of leaning? Is it to impart knowledge? Is it to improve well being? Is it as a tool of social justice? What is it for? One way of thinking about what learning is for, is to think about what kind of world we are trying to prepare young people for and how they are going to live successfully in it. Whatever that word 'successfully' means, how they are going to flourish in it, to do good work, to make a difference, to live well with other people in a broad sense. I don't mean how to get a new job or how to earn more. I mean to live successfully, in a broader sense.

And this is one way of thinking about what's happening in the world. There a lot of organizations who are at the top of that line. Who are kind a going along like this and they are getting to this point where the line suddenly goes down, because their way of organizing themselves is challenged by people who are coming up on this line. They are suddenly emerging, out of nowhere, sometimes encouraged by new technology to create entirely new ways of doing business. This line is the line of the taxi cab in London. The line of the black cab which is coming along and its developed its knowledge. Then suddenly out of nowhere comes this thing called Uber which disrupts and changes how they work in unforeseen unpredictable ways.

There are more and more places in our world where you get this conflict between these new and emerging forces often enabled by technology which threaten to disrupt and unsettle established institutions.

Out of that comes a whole mass of different things but it's rarely just a contrast between the new and the old, because where change often happens, it seems to me, is in the confluence of these forces and its almost like a kind of two rivers meeting one another and in that confluence they create this kind of sense of turmoil as the old is struggling to stay alive and the new is trying to be born and out of it come lots of different possibilities. Even if you think about Uber and taxis, there is car sharing, there is driverless cars coming, there is in cities bike-sharing and there are new kinds of public transport emerging. Car companies are changing how they think about what cars are there is Tesla, the electric car.

In other words, the future of mobility is a whole range of different things. In field after field what we need to try and encourage young people to see is that the future is open, it's there to be made, it's there to be understood, if you like to see it from the future is to see there are multiple possibilities. But being in this circle where these forces are combining, is a bit like spending your life here. In away this is kind of what I think we should be preparing young people for is what is it like if you have to be in here? This is what life is, like you have to be in a kind of washing machine and most of the time, I sometimes think there are two kinds of people. There are sort of washing machine people and they are people who iron. There are lots of people in education who iron who would like to get the creases out and to leave everything very neat. Whereas actually the world is a bit like this and you have to be sort of tumbling around with these new ideas and you have to try and make sense of it. So this is a world of flux, of uncertainty. Where bits of the future are discernible, but quite a lot of it has to be created, has to be adapted, it can't be predicted with absolute certainty. What do we know? We know that we're going to live longer lives and that at the end of those lives we're going to need more care and that through those lives we're probably going to do more things in different ways and that we're probably unlikely to have a single identity or a single job.

We know that technology will continue to pervade our lives for good or ill and that machines will become increasingly intelligent, capable of rapid learning and that any job which relies on the application of a set of

rules will in future be vulnerable to people with an algorithm to do it. Anything that can be routinized may in future be done possibly by a system or a robot and the human role may be reduced. We know that industrial systems of production will lead us into environmental disaster unless we change them dramatically and rethink them. We know that trust in political systems is declining. That citizens are less and less trusting of politicians and figures of authority and that more and more citizens are likely to do things together using digital and other networks to achieve change and that power flows around as well as through political systems.

And we know that this creates a whole set of contradictory tendencies in society and so that you see both the rise of a more cosmopolitan, open, globalized, digital society and at the same time a deep yearning for a sense of home, of belonging, of attachment. The places that will really succeed, I think, are not places that don't have these tensions. They are places that will use this tensions creatively in order to create some new kind of synthesis or some new sense of home and so the task is to not avoid this circle, with its flux and uncertainty, but to plunge into it. To be ready for it. To use it creatively. To take the energy and create things with it. That, I think, is what we should be preparing young people for.

How to prepare young people for a world like this… From following instructions to solving problems…

So how would you prepare young people for a world like that? In essence, I think it means shifting the center of gravity of education, from following instructions to solving problems. Too much of the time we have regarded education as following instructions. You follow the instructions of a teacher and then you deliver the right answer when the exam requires it. The point of education is a kind of 16-year apprenticeship in doing the right thing at the right time in the right way when you're asked to do it. Well, in future, in a world where machines will be intelligent and robots will be pervasive and algorithms will be predictive, that is training young people to be bad robots, basically. To be second rate robots. To be not very good at following instructions, because if the job is to follow instructions then things that can be programmed and can learn on their own in that kind of way around rules will be often much better at it. So we need to be ready to not do that.

What does that mean? Well, it means, actually education should be about making people more human. The whole point of education is not to prepare people to become better workers within industrial systems. The whole point is to make us more human, more empathetic, more creative, more collaborative, more imaginative, more metaphorical. To do all the things that Google can't do. Put it that way. We should do in education, schools should be places that Google cannot reach and cannot program and cannot predict, because actually there are places of such imagination and metaphor and creativity and empathy and feeling, that no one in Silicon Valley would have the slightest idea what was happening there because it wouldn't fit the program. Do you have a Catalonia self-

service tills in supermarkets, where you scan items and then you put them in your bag?

Do you remember when ATM's were very rare and then suddenly they were everywhere? So now in London, going to a self-service till in a supermarket is a kind of everyday experience, right? I come home to my tube station at Highbury & Islington, and I go to my Waitrose supermarket, I get my bag of shopping and I stand in the queue and I think, "Will I take my bag to the person who is going to then take each item out and scan it or will I go to the machine and do it myself?", and I think I'm a capable, grown-up person, I'm going to go to the machine. I will do it myself.

And so I put my bag down and I get the thing out and I start scanning the items and usually the machine goes wrong and then the assistant manager has to come and sort me out and I feel as if I'm useless and the people behind me look at me and think, "Why is that old man trying to scan his shopping? He should have someone looking after him", but then I'm determined, so eventually I get the hang of it. Now I can take an entire bag of shopping and I can take each item out, scan it, put it in the shopping bag and I can get through the whole thing and there's this pleasing bleep each time you scan something. It goes bleep and then you put it in.

Then I leave the shop carrying my bag and I think, "Yes. I have managed to scan all 20 items", and then I think, "This is really odd", because Waitrose, the supermarket has persuaded me to become a shop assistant for five minutes for free and I feel as if I've achieved something. And then I look at the person whose job it is to scan the items. I think she must think, "This is really bizarre" because of course, in effect we are doing her out of a job because me doing it myself with a machine threatens her job.

What do we do about the person whose job it is to scan the items? If you think about it for a moment, just think what a stupid job it is to stand in a supermarket all day scanning items. That's not a job that any human should really do, because humans are creative. They're thoughtful. They're imaginative. They're empathetic. None of those bar codes was put on by a human. They were put on by machines.

And so one of the challenges of the future will be what happens when all this technology means that actually quite a lot of what we do doesn't need to be done by humans. What do we do then? And once the space opens up that we might be able to do other things, creative things, imaginative things, empathetic things, rather than industrial things, how are we preparing ourselves for that?

My worry is that we have education systems inherited from industrial era designs, so that we process things and we're heading for a world where we're going to have to invent our own purposes, because actually technology will be so rampant, so powerful, that these processing jobs will become less and less common, poorer and poorer paid, less and less rewarding. If we're educating people for this processing jobs, we're educating them for defeat. We're educating them for a dead end.

So that is for me one of the big questions, is what does it mean to be a human in a world awash with technology and how do we educate people to live that kind of life in a world where technology will become, not simply a tool for us, but a kind of framework in an environment which encapsulates our world?

So one way to solve a problem is to follow instructions. If you are trying to put up an IKEA bookshelf, it is not a good idea to have a creative workshop to work out how to do it whilst ignoring the instructions. The best thing if you are putting up an IKEA bookshelf is to get the instructions out and follow them step by step. If the problem is a very defined problem and it is very containable, and it's been done many times before, the best thing to do is to follow the instructions.

If the problem is a slightly more diffused problem, say you want to cook a loaf of bread, sourdough bread, then you can follow the instructions but they don't tell you enough. So you might talk to a chef or someone who knows how to do it, or a teacher. So a good way to solve a problem is to ask someone who knows how to do it and who has done it before. I'm not saying that there is no room for following instructions, nor am I saying that there is no room for expertise, there is. But, many of the problems that exist in that circle where we are trying to invent new ways to work, new production systems, new political systems, new forms of care, new forms of housing, you name it, these problems

don't come with instructions. They might come with instructions for a bit of it, but not all of it. And if more of life depends on solving these sorts of complex diffuse problems, then we need to think of something different.

Let me just give you one example of how we think that complex problems are big problems, but actually complex problems are very personal problems. They are very small problems. Take my mother-in-law who is 87. Who has Dementia. Caring for someone with Dementia is a deeply, deeply complicated complex problem. Which is unfolding. There are no rule books, there are no manuals. Every case is different and requires attention, empathy, you can learn but actually, you have to make up a lot of it as you go along and it doesn't come with a kind of...you can't just do it bang, bang, bang. Well as we get older and more people suffer from chronic conditions, like Dementia, we are going to have to have a way to create care of activity, of dignity, of purpose for people in a way we haven't imagined life yet. We are going to have to invent new ways to live.

Learning as a dynamic combination of four ingredients: knowledges, agency, personal and social

So complex problems are not necessarily global problems. They can be deeply, deeply intimate and personal problems. I think that we have to learn how to become complex problem solvers through learning that is structured, so there is an element of progress, of structure or framework, but is also very dynamic and very relational. It's a combination of I think these four ingredients.

The first is knowledge. Knowledge matters. Basic skills. Knowing how to read and write absolutely matter. Most countries in the world think that it is important that children have a grasp of language, mathematics, some of their history where they come from. Some sense of where they live and it may help indeed to learn the language and things like that. But more importantly the kind of knowledge and attitude towards knowledge that we need for this world of the circle, is we are going to need children to be able to question, and to challenge and to debate. Not just to digest knowledge. They'll need to know how to combine knowledge from different disciplines together creatively, and they critically will have to know how to take knowledge from one setting and apply it to another setting, or to understand the underlying principles so they can extract those and apply them in a different way somewhere else.

So simply having knowledge, knowing that the French Revolution took place in 1789, that's knowledge, but it's not very helpful. Knowing that there are competing explanations for why the French Revolution happened, that really helps. Knowing that the French Revolution still has implications for the way that we think about politics now, that certainly

helps. Knowing that the idea of a revolution is itself an incredibly powerful and diverse idea, that's even more helpful.

If we go to expeditionary learning schools in the United States, each year group will in each semester study, all the subjects organized around a word. When I went to the expeditionary learning school in Queens, they were studying revolution as a word. And so they were studying scientific revolutions and they were studying revolutions movements and they were studying revolutions in history and were imagining revolution. They were painting revolution. Everything was done through this concept of revolution because actually they think that if the world is like this it's important to understand what revolution is and its diverse components. They learn through that, maths and science and history and languages and all sorts of things, they learnt it through the lens of revolution. They, at the end of their projects, all of their projects lead to exhibitions which they present. One of the ways that they do their work is they bring their projects together and present their piece of work to the entire school community.

And so one of these projects, in contrast to revolution, one of the other projects they were doing was called 'Built to last', so things that were built to be sustained. One person was doing the presentation about New York's bridges, so there was a presentation about engineering. Another person was doing a presentation about European Monarchies. They were both built to last and through this sense of coming together through different kinds of knowledge around a single idea, they made it richer and more productive. So you want to build this knowledge up, you can't leap to this more complicated conceptual forms of knowledge unless you have the building blocks in place to do it, but knowledge matters. But education is not just about knowledge, or at least it's not just about knowledge in a limited way.

The second thing I think it's about is agency. I think young people want to go to school to feel that they are agents and one of the reasons that they don't like going to school is that they don't feel they are agents much of the time. They feel as if they are passive recipients. And that basically you should go to school to make things. You should go to school to make great work with other people, and that might be a play,

it might be a piece of art, it might be a software program or a game, but you go to make things with other people, and through this process of making you learn how to contribute. But you also learn that through making you have to try things out.

So one of the schools that I went to in this book is a school called School Twenty One in the east end of London where they have adapted a well-known pedagogy which is about drafting. So the first thing that they do with year six and seven students, so these are students aged about seven or eight, is they get them to paint a picture of a Tudor king or queen, like Henry VIII, and so everyone paints a picture. And then they say to them, okay that's great, now let's try to do the second version of that and with the second picture, you see ears appearing and maybe some hair and maybe a nose. And they say, that's great, but how about trying to do another picture where you're maybe putting some clothes and some colors to the eyes and expression. By the time they get to the fourth picture, the picture looks like a Tudor king or queen. It's so different from the first picture.

They get the children to reflect on what they have made and in that process they understand that through making things, you learn how to do things better and they embed this sense of agency that you are making but also that you have to draft things and you have to go back over things. When you draft things, you have to take feedback. Which means you need to understand when criticism is being helpful and how to give criticism to other people and how to respond to that and recover and realize you could do something better.

So, from a very early age they are creating the sense that learning is about making things. Making things is about is about improving things and that is about taking feedback. So that then leads to this third thing which is the coming to school, indeed education should be a personal thing, should be about personal growth and about the acquisition of personal attributes, particularly of resilience, grit and purpose.

Because, if you are going to be resilient and in this fluctuating world, and if you are going to cut through that, you need to have a sense of purpose. If you have no sense of purpose you will just be buffeted from side to side. But actually having sense of purpose, what you want to do,

what contribution you want to make, what difference you want to bring to the world, then school needs to be a place where you can find purpose. But that means schools need to be a place of purpose and it means the teachers are there for purpose and they embody that purpose and its infused with purpose. One of the things I really like about Col·legi Montserrat is that sense of purpose that runs throughout the school. That is true of many of these schools. They are places of purpose. They are places setting out to achieve things and as a result they're places of personal growth.

And the final thing is that these places are deeply collaborative. They are bringing young people with teachers and other people often, mentors, outsiders together in a collaborative exercise of cooperating to give feedback, to share ideas, to find better solutions. And this is critical because complex problems usually are too complex for any single individual. So, if you are tackling a complex problem and you need to share ideas with other people and that means you need the social skills to be able to collaborate with other people.

So these places looked like this. They had all these circles going on at the same time. They were developing knowledge, but they were also developing personal strengths. They are giving people a sense of agency through which they can test out their knowledge and apply it. That deepened their knowledge and also had an impact on their personal strength through which they learned how to recover from set backs and collaborate with other people and in a way they kind look like this. They didn't look like lines. They didn't look like straight places. They were structured. They took evidence very seriously. They measured progress but they felt like these places that were generating greater momentum by doing all of this. And right in the center of all of these circles, I would say were really great teachers who understood their students well enough to know that some need a greater support in order to develop their knowledge and that those with personal issues and emotional issues which needed addressing in a different way from others, who perhaps were very knowledgeable but needed help to be able to collaborate and all of them felt nervous about agency, excited but nervous about taking risks and they needed support and help in doing that and when you go

to these places you see this kind of overlapping of the social and the personal making agency and knowledge. They are not kept in separate silos but nor are they mixed up in an ad hoc fashion. And it takes really skillful teaching, I think, to be able to make that possible.

And the thing that was true about all of these schools was that, that was true for the teachers as much as for the children. That these were characteristics of the schools as places not just for the learners, the students, but for the learners who were teachers. So, two characteristics of these places which stood out for me. One was, they took data very seriously. They bothered about data about their children. They bothered about knowing where they came from, what their backgrounds were. They tracked their performance and how well they are doing in their subjects. They knew exactly where they were. They weren't slap-happy about that. They wanted data and they liked evidence. Not that meant the evidence told you exactly what to do, but it meant they needed to really know what was going on. And the other thing was that they were places of research. They were places where teachers were doing research to find better ways to do things. A proportion of the teaching time was devoted to learning together to do better things.

So, I'll give you one example a brilliant school in Melbourne, run by a guy called Keith McDougall, who had been a headteacher for 28 years. Often the most radical people in education have no hair or they've dyed their hair. In other words, in education there is no correlation between youth and innovation. Actually, the oldest people are often the most radical because, a) they've got the experience and b) they can remember old ideas that they can bring forward and bring into new ideas and they've got kind of confidence, a kind of composure.

So actually I think innovation comes from all sorts of people in education and it doesn't look like innovation. It often doesn't come with an iPad. It does not come dressed in bright colors. It does not come looking trendy. Actually, the most innovative people that I know don't look innovative. The least innovative people come dressed looking innovative because they want to look innovative. Whereas the really innovative people like Keith, looks like a bank manager and so what Keith did was that he organized groups of his staff to each group, group

of three or four, to research on a topic each term. A topic that would lead to better outcome in the classroom. When I visited his school, Broadmeadows, there was one group who were just looking at feedback and they were looking at different ways to give feedback to students. Different ways for students to give feedback for teachers. And this group had between them read 20 academic papers. They were doing proper thoughtful research and they were doing that because it really mattered to them, that they wanted to have a well grounded practice.

So, these are places of growth for teachers. They are places of learning and research and the teachers themselves should go through all of these kind of circles if they are expecting the students to do so.

How to make this kind of learning possible at scale? Dynamic learning, dynamic teacher, dynamic curriculum and dynamic assessment.

So, I think the future of education is to explore that basically. How could you make that kind of experience, which you can't instruct? You can't teach in a traditional way. You have to create these dynamic experiences to people so that they can acquire and learn these things. How would you make that possible at a much greater scale, for millions of children, not just a handful?

Well, I think there are several things in this. One is I think you need dynamic teachers. And so I think there are important questions about whether you can develop, equip, train, support, guide, nurture, create collaborations which allow teachers to take the risks involved in doing this. It's not easy. It's unsettling to authority, it's easier to revert to normal. Often there are difficult classes and difficult students with whom you need to have very difficult conversations. It's not automatically successful.

So, I think there's a way of thinking about what the role of teaching is, but the thing that came out of it for me was the absolutely critical creative role of really, really good masterful teachers who knew what they were doing and who could create these environments and these experiences for children, more important than ever.

A second thing, would be a dynamic curriculum. So what would it be if you had a curriculum that didn't just adjust every five or ten years, but could adapt and adjust and maybe different schools could take different bits, but still satisfy the overall curriculum and which was able to blend things in new ways so that, as with those expeditionary learning schools, you weren't just doing geography over here and history over here and

science over there, but you could find ways of showing how you could combine those and you got rewarded for showing that was possible.

The most Important thing however is this. Standardized testing is like Agent Orange, basically. It's sort of spraying this kind of killing substance over most of the education system. It is a silent killer of creativity in my view. So, we have standardized tests of individual knowledge of content for a world where we need to encourage people to solve problems in new ways, collaborating. Where the content matters, but it's also what you do with it that matters. And where you can't tell what a good answer is absolutely at the front and you've got to see that what can come out of the process might matter just as much as the outcome. And so I think there's a whole agenda here of people all round the world who are now developing new approaches to measure in resilience, collaboration, entrepreneurship, creativity and finding ways to be able to say to parents and politicians, we can do this without it being at risk, without it just being an experiment. We can find ways of doing it in a more structured way.

If in Catalonia, you were able to describe what dynamic learning was for an entire system. If you were to be able to develop teachers and others who are able to do that on a daily basis. If you could create a curriculum that was designed to make that possible by creating this sort of blend of these features of knowledge and other things. And most importantly, if you could come up with a way of young people sharing what they can do through performance, through their actions, through what they can make, what they can do in the real world then this would be a massive step forward for you and for the rest of the world.

And what I'm absolutely sure of is that, there are the ingredients developing for something much bigger. So I think the legitimacy of the existing system can no longer be taken for granted. I think there is mounting evidence of dis-functioning. I think there are more and more people experimenting with new ways to do things and, critically, I think there are elements that you would regard as mainstream particularly employers and some parents who are now prepared to think afresh about what education could be. And so this kind of stuff that I've been talking about is not just about something alternative or progressive or creative

or any of those pejorative words that marginalize this. They should be absolutely mainstream.

We do need to get universities, politicians, parents and others to agree with that, we need to build this into something that becomes obvious not unusual, everyday not special. I'm just going to read a little bit from the final section of this book, which I think for me sums up where we're at.

What is at stake in the debate of the future of learning is not whether school systems rise or fall in the PISA rankings, which is what obsesses most education ministries. It's about how well education prepares young people to flourish in a society awash with intelligent technology, facing an uncertain future with endless opportunities for collaboration, but deep seated and urgent challenges which need addressing.

We need to learn how to become more human, even as society becomes more technological. To become more creative as work become more programmed. To become more empathetic as systems become more pervasive. To take the initiative rather than meekly follow the instructions. To work together rather than go it alone. We are not robots; we need to excel at being human. That's why our education systems need to become more dynamic.

Thank you.

Questions

How do we create a learning environment that is inclusive
for everyone?

What I think you see is a quite lot of now is more academic schools kind of bolting on things like entrepreneurship or other things, and I think you see a lot, both in the US in the UK, of kids who've done really well then getting to the university and not really being able to cope with independent study and things like that. I think that one of the things that may happen is the realization that you can do incredibly well in tests and not be very well-equipped for the world.

How should you respond to that? I think the lesson of these schools is that you can create transformational experiences and that often these are experiences which take the children out of where they are to see the world in a different way which can disrupt their perception of who they are, of what they can do in some kind of way, which is very important and that kind of dialogic experience, if you like, of being in dialogue with some other setting is very important.

So, there's a great project I know in Canada, called Pathways to Education, which deliberately takes children from these less advantaged backgrounds, gives them mentors who work within various forms of companies and other things and deliberately creates the sense of this juncture or makes them rethink their approach.

But the real lesson of these places is that, actually you need to do it in the way that builds up these capabilities over a long period of time and it creates a kind of culture in a concrete collaboration out of nothing. Actually the skills of empathy, of cooperation of how you are with other people, they need to be built up over a long period of time, so that they

are really well-grounded. Then, this is the point about the school called Broadmeadows in Melbourne which has 70% of the its intake are refugee children. Most of them don't speak English as their first language. And Keith, the Principal, said that, for the first 10 years that he was there, he basically tried to make the children feel better about being failures, basically. They would fail exams and he would say, don't worry, you are a really good person and they would be deeply angry and frustrated and then he'd get a counselor to come in to deal with their anger and frustration. And he said it took him 10 years to realized they wanted to do well in their exams and actually, what they should be doing is to equip them to do well in their exams.

But to do that, they needed to deal with, to attend to all of their social and personal issues that they had to deal within their lives. So they are an incredibly structured school at developing cognitive ability, but also attending to personal strengths, to their ability to socialize, to where they come from.

I'll just give you one example, I sat in his class, they have seven learning behaviors in the school and one of them is self-regulation. So, you have to learn how to become self-regulating. And if you've read, Angela Duckworth, Carol Dweck and others, the ability to self-regulate is a very important thing and it's an emotional self-control and it's about you mastering yourself.

So I sat in class with a boy who was six. Whose learning behavior that he was trying to master that month was self-control. So I thought what kind of conversation are you going to have with a boy who is six about self-control? So, I said to him "what does it mean to be self-controlled"? And he said, what it means is that I have to make less noise, I can't argue with people in the playground and I've got to think about other people. That's what I'm trying to do.

They were systematically trying to create this capacity to be more collaborative, more emotionally-rounded from a very early age. Because that would affect how he is going to learn, and that would affect his outcomes in other ways. This school, Broadmeadows, is an amazing combination of highly-structured, it's very rigorous, it's incredibly thought through, it's very exacting and demanding, sets very high standards in

expectations, but is incredibly emotional and relational and empathetic and warm. And the two are not in opposition to one another. The two go together and that's the key thing.

Will everyone have the skills to do creative work?

Your point at the back about, what are we going to do when machines do everything and am I suggesting we live in an arcadia of creativity? I'm not, but I do think that if we think success in education is being able to do exams, where you do exactly what's required, when it's required, then machines are much better at that than we are, basically, because you can program them to do that.

Unless we're all going to become like airline pilots which we're basically operating systems that fly by wire, or autopilot, where we're looking after systems but we're not actually doing very much, then we need to think about other ways to do it. I think there is a massive work in the economy which is going to be about healthcare, technical, practical jobs which are actually rather down to earth in some ways. I don't think we should just prioritize creativity. I think that at Templestowe College in Melbourne, another of the schools, every child is expected to have created a business by the time they leave school, and to have a track record of the business. They have seed fund of $25,000 to invest in businesses that the pupils have created, and I think that's quite an interesting idea. The idea that you should go to school and think that you might make a business, like a social business.

I met a boy there called Jake. Jake hated school and loved snakes, so they worked out that he would go to school if a lot of his learning could be related to snakes. This is a boy who's very able, very talented, but being very badly bullied, and was very disaffected and very vulnerable. Lots of extra space in a room, they created this snake room. So how do you get more snakes? This is a brilliant school, they got lots of old lockers where children put their stuff like cupboards. They said to Jake, "Would you like to sell the old lockers?", 250 lockers. So Jake sells these lockers on eBay, he earns two and a half thousand dollars selling the

school's lockers on eBay, and with the money, he buys some more snakes.

Then he says, "Well, what I'd quite like to do is create a business where I show these snakes to primary school children." They say, "Well, if you come up with a business plan, then we'll consider funding it." So he comes up with a business plan with their help to employ a teacher. So Jake is employing a teacher to go with him to take the snakes to primary schools, and the primary schools will pay Jake, so that he can then pay back the investment the school's made in his business, which is an educational business. Jake leaves school with a higher leaving certificate, but with a track record of running a business for more than a year. As I went around that school, all of the pupils that I met were doing some sort of work, activity, business, creativity, making a difference through something like that as well as studying.

I think there's something in that, I think that we should explore is what difference that would make to young people if they could do that. If they could leave saying, "I've got these results, but I've also got this thing that I've done, and this thing is a rather practical down to earth thing, but I know how to do it." That, I think may then speak to this sense of operating in more inclusive environments that I've seen schools like Broadmeadows and Broome Street Academy in New York. What you definitely need is lots of attention to these personal and social aspects of learning because children don't come to school necessarily ready to learn in traditional ways. Actually the people who these traditional systems are most letting down are the people most in need of innovation.

There is in my view, absolutely no trade-off between innovation and social justice. Actually traditional systems are bad for opportunity and social justice because they favor middle class academic kids, and they're designed for those kids. They're not designed for kids who think, and work, and learn in different ways.

What sparks changes in schools?

I suppose one thing is to start with things that are definitely not working, so, where is it definitely not working? There's a school that I write about in the book called Shireland's Collegiate, which is an academy school, fairly traditional in the West Midlands, brilliant team. Not traditional in their outlook, but nor were they progressive, they wouldn't describe themselves as that. Year seven is the first year in secondary school.

They did a review of year seven one year, with the year sevens. They bothered to get feedback face to face, and there was so much crying that they just collectively decided they couldn't do that again. The story that the children told, about going from primary school to secondary school, about their loss of identity, about how fearful, and anonymous, and confused they felt, meant that they'd just decided they were going to do something different. From there they created a curriculum built around 11 competencies, all of the learning.

So they modeled their first year much more like a primary school, so you have a lot of time with one teacher. Year eight, a little bit less time. Year nine, a bit less time. Lots of project-based learning, lots of emphasis on the social and emotional aspects that predetermine other aspects of learning. What they did, and what a lot of schools do, is operate where it's not working and where the examinations system isn't too stressful, if you like. That's one thing, the second thing is I always think that opportunity breeds capability. There is more innovation, there will be, of course, there will be teachers who just absolutely do not want to change, but there will be teachers who respond to opportunity. If you can create it and then create a bit of a nucleus of that, and then you just have to keep the school open. You have to open up to what's going on in the world, and ideas, and research to make it question how it's doing things. It's not easy at all, I know.

Final thing, is that none of these places did this quickly. It takes one step back, a step forward, using crisis, using a bit of success, using a bit of extra money, doing something outside school. Building things up, so that you gradually get enough momentum. I do think that it crucially involves sort of interplay between having a vision but also delivering.

Never losing sight of the fact that you have to be competent, you have to be on top of things, but having a vision about where you want to go to. The innovative headteachers who can create environments in which good teachers can do great work, are I think, amongst the most valuable people in society. Seeing that when headteachers are capable of doing that, is a really remarkable thing.

I hope that in terms of sparks and networks, I know that you have this school 21 network and you're talking about creating more networks. My experience in networks in education is that people love talking. Networks can be a way just for people to network, talk, not really… so, you have to somehow link that collaboration to action in some sense and that people are prepared to learn in action, I think, and to invest real money in what they're doing, but collaboration is an absolutely critical component. London's schools have improved significantly and I think it's a more collaborative atmosphere within them that's been absolutely critical to that.

Are external staff needed in schools?

Using people outside school. High Tech High is really good example if you know High tech High and Larry Rosenstock. Like expeditionary learning schools they do a lot of work outside school in real world environments. When they're doing science they do real science, they do real experiments. When they're making films they make real films and they try to expose young people to learning in those environments. That obviously requires some facilitation by skilled teachers who understand what's going on, but that combination is really powerful that, the thing I'm involved in Apps For Good which we created. Basically it's a way to bring together teachers who wanted to teach coding, app development and things like that, children who want to learn with companies who want to help. Often the people in the companies…we have 800 mentors who mentor the children on the courses. Usually they're doing it because these people had a dreadful time at school and they want to help other people have a better experience.

So if you could somehow mobilize that sense of connection, then our experience is that, that course can have a huge transformational effect on how young people view learning because it creates this sort of pull that keeps them coming into school. I think that creating structured ways to do that obviously - there are lots of experiments of schools that are not schools. In Amsterdam, for example, there's a city school which uses the city as a school and then they want to create a model of city as a school, so there's no school. You just use the resources of the city to learn and you go to a place everyday and then you go off into the rest of the city everyday to learn in different ways.

I think learning how to play with that boundary between school as this defined thing and the real world is going to become increasingly important. Teachers and knowledge is very very important of course but making knowledge powerful is about using knowledge with other things. I think that's why when I go to these places that philosophy of knowledge and agency collaboration and personal growth is a philosophy for the whole school. It's not just for the children and it's a way of thinking about what it means to be a good practitioner, as well as being a good student. I think that is developing in teachers this capacity to be able to engage with these other ways of working which doesn't threaten their knowledge, but instead amplifies it is, very important.

What is the role of publishers and providers of educational services?

I think what happens to content is happening to just content across the piece is that it becomes more and more of a commodity unless it's very different. This work is funded by Pearson. Pearson is a huge exam testing education textbook business and it's on that line Pearson. Actually it's just at that point, they're looking over the precipice and actually they can't see a business in 10 years' time. There are more and more businesses and more and more fields looking like that wondering what their future might be.

What is it? It will be content plus community. Or content plus service or something in addition to that which is pure content. It's like pure

knowledge, just having knowledge is not enough, you need to do these other things with it. That means that there will be new players and so on and so forth. What are my worries about education? If education is simply a content delivery business, so that if you follow the content and you do the exam, you get the qualification, then why wouldn't you just go to Google to get that eventually? Or Apple or Amazon or whoever it was. Because that's what we do with music or films or with Netflix or what have you.

It's very telling to listen to the guy who founded Udacity the online digital learning platform. Massive online courses turned into a business because they can deliver a technical degree in six months rather than three years which almost has a guarantee of getting a job at the end of it. If education is simply about getting a qualification to get a job, then there are going to be people who come up with more effective ways of doing that. That's only going to increase the sense of competition, which is why education needs to become about something that can't be commodified or can't be turned into technology and that's why I say it should be about becoming more human.

That alarms us because we're frightened by what that means, that freedom and that possibility because we need structures, rules, discipline all the rest of it. That's what schools provide, but that is actually the long-term the best thing it can do, it seems to me.

Besides creativity and innovation, is it necessary to work on values?

I just want to link your comment which is about purpose and values with this gentleman's comment which is basically about, to paraphrase it, capitalism is completely fucked. Basically capitalism is in a complete mess. These are very important questions because in effect your question is how should we be, in the language of Paulo Freire, how should we be educating children for critical consciousness to being critically-engaged with society rather than just willing workers?

Actually, we're going to need to reinvent companies in future. What a company is and what employment is, what a job is. We're going to have

to have young people prepare to ask questions about that not just fill out the form and hope they get the job. We're going to need to reinvent capitalism because capitalism is so unequal and so unstable and so unbalanced. This is a huge task to reinvent work, to reinvent money and banks. To reinvent companies and what they are, but that is the task that the generation coming through school is going to have. It should centrally be about values, it's got to be about values and it's got to be about purpose.

When I go to really creative places, so I do work with cities, I do work with companies, I do work with schools, the core thing that they all have in common is that they are communities, they feel like communities, they're creative because they've got a diversity of skilled people doing interesting things and coming together. But they have a sense of cause, they have a sense of momentum. The thing that both is very uplifting and for some people annoying about Barcelona Football Club is that it feels like a community with a cause. It stands for something more than just football. You have to be prepared to stand for something more than just getting good exams. That's a challenging and difficult thing.

Education has to be about purpose, has to be an education in purpose to find a purpose. You can't expect children to go to school to find a purpose if the school has no purpose. If it doesn't itself inquire into what it's purpose is and isn't prepared to have that debate. That's I think why education needs to be an education in self-governance and debate and all of those things, not just an education in diligence and doing the right thing.

Is innovation a responsibility of teachers alone?

Then finally, this question of the responsibility of teachers and the responsibility of systems. It is absolutely the case that, what these schools show is that when you've got skilled, committed practitioners you can find more space to do more creative things, but to do that at a greater scale with greater momentum you need much more system-level change. That means engaging politicians in that debate, but actually

thinking of the changes, a collective thing that might embrace the whole system, that might embrace parents and teachers, will have lots of lateral conversations, will have conversations at the school level, will have conversations at the societal level.

Importantly, it would have to embrace the societal conversation about what the purposes of learning are. Completely different systems in Switzerland has a dual system, has a vocational system and an academic system, but the vocational system has a very high status in society because there is a societal agreement that vocational education matters. In Britain vocational education is seen as very much as second best, that's because there isn't a societal agreement or debate about it. It's very important that in this process that you're embarking on with New School 21 and these other networks, that that becomes a conversation about what learning is for for the whole of society, not just for the education system and not just for teachers.

It becomes something that everyone feels that they have something at stake in I suppose in that sense. Definitely it has got to become something bigger, but if you're up to do that then you could imagine in a society the size of Catalonia with, however many, 7.5 million people a very successful economy and in very many ways a successful society, creating a kind of school system that would be the envy of many other places, it seems to me, because you have some of the ingredients here of your cultural specificity, your values and your traditions and this openness to the future, which is a quite rare combination and I think that's a real opportunity.

About the author

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In 2005, Leadbeater was acknowledged by *Accenture* as one of the world's most influential thinkers. He is a writer, a visiting fellow at Oxford University and The Young Foundation, and has worked in a government advisory capacity, including with the UK Department for Education's Innovation Unit.

His more recent publications include *The Problem Solvers* (which can be downloaded free in PDF, in English); *Innovation in Education: Lessons from Pioneers Around the World* (paperback); *Learning to Make a Difference: School as a Creative Community* (WISE); *We-Think: Mass innovation not mass production* (Profile Books); *The Frugal Innovator* (Palgrave Macmillan) and the video *Education innovation in the slums* (TED).

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