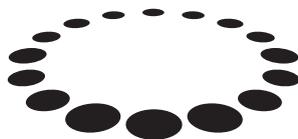


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**Building a School for the
Digital Natives Generation**

Kirsti Lonka



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Introduction

People ask me what makes Finnish Schools special, I think it's very much teacher education, so in the beginning I'm going to say something about our teacher education because what is very exceptional is that our subject matter teachers have been already educated at the Universities from 19th century. They've been studying mathematics, linguistics, biology and so on. But, already 40 years ago - almost 40 years ago, class teacher education, they came to the University and everybody must have a Masters degree and also in my classes of educational psychology I have kindergarten teachers and they must have a Bachelors degree. But if you want to be a director of a kindergarten, then you need a Masters degree. We don't think that Kindergarten is somebody where you put kids just to keep them there so that parents can go to work. But we think that kindergartens are pedagogical places.

A very brief summary, if you don't know very much about the Finnish System as I said, the level of teacher education is one of the highest in the world and also it's very difficult to get into the teacher education, it's more difficult to get in than to medicine or law or engineering. For instance, my students who are studying this Master program, Bachelor, Master five and half years, they have to do also subject matter, didactics in 14 different subjects, they specialize in two. What is interesting in the Finnish System is that we have very much handicraft, sports, handicrafts arts, music, and these kinds of arts and domestic skills, so we learn how to cook, both boys and girls. Nowadays, both boys and girls go to technical work and the handicraft. It used to be so that boys would go to technical work and so on, but now they are doing it together.

Our asset and our problem is that we have very autonomous teachers. It means that nobody's watching what they're doing in their classroom

and they're highly trained professionals who are doing their job and nobody's coming from the community to watch what the Principal is doing. It's very autonomous. The school days are quite short, holidays are about three months per year. My husband is an elementary school teacher so it's nice. Sometimes he can follow me when I go abroad. We have hardly any standardized tests, the major first really high stake examination is when people are 18. First, they do the matriculation examination and then they apply to Universities and it is very competitive to get into the Universities.

School starts at the age of seven, and before that we have the preschool program, but still the main form of education is free play. For instance, my children they wanted to play Spice Girls, they were born in the 90's, so they have these projects that are then Spice Girls and then their kindergarten teachers were assisting them with their project. They spent very much time outside, only when it gets -15, then they don't have to go outside. But usually they spend four hours a day, they usually do things in the forests and go downhill and get very dirty and it's not very civilized. We always needed to put them in overalls but we think that promotes creativity.

What is now going on is that we last year had a new curriculum in Finland, very much 21st century skills. Also, we're having a reform in teacher education. I've been trying to do that for the last 10 years, I came from medical education, I've been in Helsinki and Karolinska Institute in Sweden, helping medical schools to become problem-based. But now helping teach education to change is like moving a graveyard. Because it's very difficult to change something that is already good.

Last week in London, I met some Japanese people, because the best PISA results this year were Singapore, Japan, Estonia; only a million people, Taiwan, and Finland. I happened to be in Taiwan when the results came out and there were people from Singapore and Japan and Hong Kong who were also doing well. We were all scratching our heads because we feel that we are doing good things but we are not doing good things for our students. We may get good results, but we are losing engagement and that's what I'm going to talk about.

How to create new cultures for study and academic work?

Our biggest challenge is to change the learning environment. I don't know—we're sitting here in this thing that we've been doing for like 400 years, there was this priest who was talking and then there was this parish who was listening, but this kind of education that people are staring each other's necks and this this kind of isolated offices where they're sitting. Well, this is how things have been for decades, centuries. But when I went to a cafe with Teresa today, and with Val, we saw everybody sitting there with their computers, there was WiFi and they were working very intensively, and if you went to Starbucks in Beijing or in Taiwan or Helsinki or South Africa, you can always find these people working there, intensively.

Our problem is this huge gap between what's going on in institutional education and what's going on outside. That is a big problem. How many of you would think that your institution is more like on the left side? If you raise your hand in my class I'm not bugging you I just want to know the frequencies. How many of you would think that your institutional school or workplace would look more like this? If you're coming from school sector probably, workplaces look more like this, more and more. If you go to Microsoft or Intel or some intensive places, even factories look a bit different nowadays.

Our problem in EU is to has this creative, active EU citizens who can solve very fuzzy and wicked problems in teams. Our physical settings, ours social spaces, our technologies may help us or they may hinder us. Everybody knows what happens when the internet goes down or the printer doesn't work and you go to classroom and try to have a smart, you know, something and it becomes very dumb, very quickly.

The problem in Finland and Japan and many other countries is that school engagement worldwide is declining. What is keeping Japan and Finland and countries like that up? A sense of duty. But we cannot play that card forever. Our girls in Finland are best in sciences and the best girls in sciences in the world, but they hate it. None of them wants to be an engineer, they are just getting good grades in technology. What's the use of that? Are we alienating our teachers with our practices, is my question.

Maybe you can already guess what I'm answering. How many of your children love school? Do they love it? Usually they love it, in Finland they love it when they are seven and go to school, but already during their spring term they start to get bored. I don't know how much you like listening to this Finnish-Canadian weird accent here, how long, but usually it's 20 minutes that adults can listen and then we are afraid that our kids are distracted because they cannot sit there for 45 minutes and listen to the teacher.

I was in the EU Parliament and this report I wrote is available on my website and actually the executive summary's in all EU languages, so it must be in Spanish, I'm not sure if Catalan is there too? Maybe not? These are our 21st century skills, creativity is there but it's behind all this. Thinking skills, learning to learn, cultural competences, communication skills and self-expression. I think you are much more sociable than we are. You are even much more digitally-engaged, with Twitter and all this that your director was here and he had all these webinars, and Twitters and Hashtags and everything. Our director is much worse. Research is showing if you are sociable online, you are also sociable offline. We are unsociable in three languages. We really need this. Then, even some youth have problems in taking care of themselves in everyday life skills, everyday life. Multiple literacies, it's not only text anymore. It's visual, Instagram, Twitter, different kinds of literacies, reading media, understanding what President Trump is saying. Well, that's too much for me.

ICT competencies, you can have very good ICT competencies but you can tweet bizarre things. You've noticed that. It's not only about using technologies, but knowing about safety and good ethics and good

interactions, and then entrepreneurship. Only 8% of Finnish people are entrepreneurs. They are trained by people like me who are from the university, training teachers who never see any kind of business life. That's one big challenge is how to have this contact with business life. In Finland, there is something like, "Entrepreneurship Village", so that all sixth graders, 12-year-olds spend one day in this business center and start their own businesses.

How to prevent boredom and burn out and support the new generation?

What is really interesting, our immigrant students start blooming there. Finnish people are very often customers who go and buy things. Then, there is this guy from Afghanistan selling things. Actually, same happened in Namibia, in Africa. They felt that they were a bit Finnish, like all these people from Pakistan come and start businesses and Namibian people only want to have salary jobs. I don't know how it is here. But I've learned that Catalonia is the engine of business in Spain or in this area. I guess you are very good in this too, but we need much more of that. Especially, marketing is difficult for us. Do you know what this guy is here? He is a Hikikomori.

There are 630,000 Hikikomori in Japan. They used to commit suicide before examinations. Now, they refuse to commit suicide but they refuse to come out of their rooms. Imagine, Japan and Finland, we have the same problem. We are getting gray. We don't have enough young people. Japanese have it even worse. There is no immigration. In Finland, we have hard times getting immigrants because we are so crazy. Who would want to come there? But imagine, he has a samurai sword to prevent the teacher coming and taking him to school. He only goes to the washroom.

If you Google this phenomenon, you'll find more about it but still, there are millions of children around the world who are getting burned out and bored at school. Very seldom if your challenge is this high, and your competence is here, then you are burned out, but if challenge is here and your competence is here, then you are bored. The problem in Finland is, in our mind, the gap research is showing that especially those boys who have very good technological skills, they start becoming cynical against school, already at the age of 12. The main problem we have is

that we are losing the boys especially from the northern and eastern parts of the country.

This is a problem which is leading to Brexit and Trumpism and all kind of post-truth things, is that we are alienating boys from the school system which is run by ladies. Girls have their own problems. In Finland, our research is showing that girls are not getting cynical but they're getting burned out. They both have problems at school. Girls think it's their problem that they are not studying hard enough and boys think that school sucks. I don't know which one is better but both start being alienated. This ends up with girls who are good at science but hate it and that's the Finnish problem.

What is engagement?

You can emotionally engage. It very often shows if you are absorbed and time is flying and you are in a flow. You can be cognitively active. Now, you're sitting there and you're not telling or acting anything but you may be cognitively very active and curious about what I'm saying and about what's going on in Finland. But you can also be acting in a way that shows involvement or acting in a way that shows disengagement or watching cat videos or doing something else.

Disengagement with this, what I said, what is the problem with girls, exhaustion, feeling tired, lack of energy. With boys, it's very much in Finland, lack of meaning, alienation, and inadequacy – means that you don't feel that you are good. You experience failure. What is interesting, our research is showing that those boys who are very good in technology, they feel inadequate at school. If you take your notebook and you have to make direct margins with a pencil, they very often fail. Handwriting may be this and that but then they are tush-tush-tush when they are gaming and coding or something like that. This is one of our studies. Actually, we paid 2,000 so that you could have it free because it's a journal of psychology, *European Journal of Developmental Psychology*, I think.

If you click it then you can load it, download it. We found 46% of elementary school students feeling some kind of cynicism towards school and especially those who were digitally engaged and they all felt that they would be more engaged at school if social digital technologies were used at school. We've been thinking, what is interesting is if we talk about digital natives, I'm going to talk about that pretty soon. I should because I have to finish! If you're talking about them, we need to talk about this digital challenge. I'm almost over all this theoretical blah, blah,

blah. At the end of my show is then going to be big pictures. They're going to be faster. In Finland, we're very slowly warming up but then, when I'm get in the flow then you have to carry me away!

The digital challenge

The digital challenge is this – that is my elder daughter. She was born in 1991. Many of my students were born in 1997, so they are very much digital natives. These people who are going to be teachers, students in the university. This digital native concept is very controversial. We've actually published an encyclopedia book chapter on it with [...]. The book won an award, so there must be something that we did correctly. We are not saying that they're better in using any devices. Commodore 64 – are there any Commodore 64 people here?

Everybody in the 80s, they needed to know how to program computers in order to use them. Today, they are very user-friendly. One-year-olds doing like this. Happy. They don't know what is inside the machine. Very few of them can code like maybe 10 to 15%, but what are they doing? They are multi-tasking while they are listening to me, they may be tweeting and Googling for more information and doing things. It's good if it has something to do with this topic. They read from the screen. I need these papers. I'm, obviously, an immigrant. They chat a lot. They wouldn't send an email. For them, email is old-fashioned. It's like sending a postcard.

They are not going to the bank. That's like, what would I do there? They open the chat and they chat with the teller. That's why business has to develop also that way. Twenty-five percent are gaming, active gamers. They are very socio-digitally networked. They are only offline at school. The school day for them is like, "Please fasten your seat belt and put away all the technical devices. You may put them on when we've landed in New York seven hours later." They are basically online everywhere else except school and they are almost too dependent on their mobile devices, but they're developing strategies. Like my daughters, they would go to

McDonald's. They would put all these devices in the middle of the table, switch the phones to silent and then the one who touches the mobile phone first is paying the whole bill. They try to regulate it, but many of them would need rehab. "Selfie" was the most common word in 2014, the word of the year. 2016, it was "post-truth."

But the problem is that school is very much designed by baby boomers. When radio came, people were worried that now they don't read anymore. The telephone came. Everybody was worried that now they're just talking on the phone and nobody's socially interactive face-to-face. I was born in the 1960s and my students were born in the 1980s. We're still the same generation with them, just 20 years, but when my elder daughter was born DVDs, digital cameras all these came up and then my younger daughter is already Generation Z. She was born in 1995. She doesn't remember any time before the internet and mobile phones. Even these two are different generations. So it's growing exponentially like this.

No wonder we are burnt out. Because we all used VHS videos, CDs and floppy disks, do you remember floppy disks, for such a long time, but then suddenly, everything changed and very much in 2008, when social media started to become more common. You can find all these blah, blah, blah from my website. There is a direct link to this report. What I was telling to this EU parliament thing was that it's not so much about learning technology or computer-supported learning, that's kind of the last season thing.

It's more like this integrated system with these normal technological tools and social media internet that enabled people being constantly in interaction and then we talked about social digital participation. That is these informal ways of being in conversation, for instance, I've been following tweets from Barcelona the whole last week and re-tweeting and I've been socially, digitally participating even if I don't understand, I have to put Google Translator or ask my PhD student who's a Spanish language teacher and then something is in Catalan and I have a hard time understanding.

The pedagogical challenge

But anyways, this revolution has taken place during the last 10 years and we act as if nothing happened. In Finland, we have noticed that actually in order to make this digital leap I think we need a pedagogical leap first. Because blended learning is not like people are listening to lectures and then they go to the E-learning environment. That's not very engaging.

This is a bit boring but I put some of our latest findings. This paper is coming out very soon. Our students love their teachers. Pupils really think that they are the main source of their engagement. They are very good in face-to-face. They are very good in traditional pedagogy, even interactive pedagogy, but the only thing they cannot do, they cannot help them in digital engagement. They cannot help them in using technologies in a meaningful way and then I've been looking at teachers' ideas of learning.

Those teachers who only teaching facts and share their knowledge, they didn't find these 21st century skills relevant at all. Where is the place for critical thinking or creativity and critical thinking doesn't mean that I'm criticizing other people. Critical thinking means that I'm critical to my own thinking. That I can constantly evaluate my own practices critically and change them. That's critical thinking. Usually we think it's criticizing others or some text or something.

Well, 70% of Helsinki area teachers had this kind of surface approach to knowledge, giving certain answers to the students. What we need is an epistemic change, we need change in the ways of how we think about knowledge and learning. Do you know what is the most difficult sentence for a teacher in Finland to say or a professor, the most difficult sentence? "I don't know." Yes. I have to confess. It's very difficult for me to say I don't know.

Nobody knows where we are heading actually with this digital leap or whatever but we need to try transform our physical spaces, our social practices, our virtual ways of interacting, our pedagogical models. We need to change our shared mental models of what learning and knowledge are, what is critical thinking, what is creativity and also our technological solutions and our software from mono-logical culture to a small culture collaborative knowledge creation. That's what Finnish learning researchers have been saying for the last 20 years already.

These kinds of models that we have been trying to apply for the last 20 years and now developing, putting interest and motivation in there as well. Before you start teaching something, find out what people already know. That's typical in science education. Activate their minds. Diagnose what they know. Catch their interest.

Then your task is to feed forward, motivate them, maintaining the interest and constantly have this formative assessment and summative evaluation should be assessing conceptual change. Teresa has been doing research on what kind of feedback is feed forward. It has to be informative. It has to be specific and it has to be epistemic. It has to be what do you know? What is interesting? What would you like to learn more? How does the reader understand your text, making you evaluate what you already know and foster it.

Phenomenon baselining, I forgot. We still have this thing. Because it's very Finnish thing and it's confusing for our teachers. In our new study plans, all schools must do at least one or two phenomenon-based projects per year. Koreans have STEAM People in Taiwan, Korea, Singapore, they're doing Science, Technology, Engineering, Arts and Mathematics but in Finland, it's even more bizarre what we are doing is integrating life and death. It's about what is life and what is death.

From biological, theological, from the point of view of Mathematics, expected life or dying of hunger in different countries, statistics but also art, experience of sadness, death, birth, in arts, literature and visual arts, how you can integrate. The idea is to have this kind of integrated thought that you can think out of the box and not only teaching Mathematics. We are saying that we are not supposed not to teach mathematics, we should teach our students.

Then if teachers together start collaborating and doing this kind of project, they start thinking more about learning rather than just delivering their content. This is very difficult for our subject matter teachers and we have a reform going on in our teacher training. These are the pictures I promised. I started really being anxious about this because we were alienating students. I had 400 students in my class. They were our future teachers but I didn't have tools to help them to be sociable.

We got this library space and we turned it over summer into an engaging learning environment following that pedagogical model I showed you so we can do phenomenon-based, problem-based, student-activating lectures, different kinds of designs and here is a video. Maybe I don't have time to show it now. Do you want to see a video? How much time do we have? Because when I get engaged, I talk too much but here if it works, we can see that it's not about— technology is about how you change rather than sitting in the lecture hall. If it doesn't work, well, usually nothing works, but here everything works of course because we are in Catalonia. You can watch this, it's a very engaging video, but it's two months on how people interact in this plaza.

Maybe I just put it off. Now I've screwed up the whole thing. This is actually a good example because the music is nice. This happens in my class constantly, and usually, I ask some of our students to come and help me. Once I had these students who only spoke Russia there it is. I'm sorry, it was kind of embedded link so it sometimes crashes the whole Powerpoint, but this is what teachers are anxious about. They always should know how things work and, they feel embarrassed if something goes wrong, and, there they are. Are you sure you want to watch it?

Well, here you can see that the social interaction changes all the time, and not everybody has a device. There is usually one or two tablets on each table. The idea is these people talk, and then they share, and then they send their ideas to that big screen, and it's there are different kinds of ways of working, and this is not a teacher's place, this is— it's like what you have in aeroplanes for directing the whole thing. Our technology person is there, and when people disappear there are little rooms where they can go and deepen their discussions. Sometimes we are dancing there, sometimes we are not using any technology at all. There is a

concert, and this is Rovio, some playing thing, or gaming. There are some children. Can you imagine what can make Finnish people so interactive? But usually if people are very shy, they can, they don't have to raise their hand, they can just throw their ideas, and then we can organize them together.

That was a doctoral defense, it was a bit formal. You can say that you put the tablets there and, this is a doctoral defense. That's why they're like, it's like a ceremony. We can have 120 students, that's the whole class teacher intake, we can have them at the same time. Now, I'm afraid of touching it. What's happening? I should get back to my Powerpoint, can I just escape? No?

I have just some pictures for you, because then, now, we're there. This is, for instance, it looks like I'm constructing a concept map there, but it's actually the students who are sending all these concepts, and then we are collaboratively organizing them, and nowadays this Flinger technology allows that we can share ideas in a matrix and they stay there and we can take it up when we start the next session. It's very flexible. Then, we also, when we still had some money, before government took it all, we also wanted to have students, so that we don't have small groups with teachers only, but we have, they are, have self-directed groups where they can also create knowledge, and we have a similar office space upstairs, where we are working in the same way, and we are doing lots of things with our hands.

We are making food, and this is gaming, and we can draw on the walls, and this is an animation workshop. We're doing very many things with cardboard, and music, and painting and writing, and then taking-making an animation with a tablet. We have this microphone that we can throw on, if it's a big class then you can - it's nice when people catch it, it's a catch box.

Trying to make more playful. Finnish people are not very playful, we're a bit too serious, but I've seen what happens, these are for instance my PhD students, who are with first-year students, and with this business person doing different kinds of things. Sometimes it gets- this is our [...] it gets a bit too wild even sometimes, but then when I go to developing countries in Africa, they start almost crying, like, "Is it very expensive?"

Actually, we didn't get any university money for this. Oh, actually some building money and so on, but basically all this technology and everything we have to had different kinds of projects, and companies and foundations to give us some money to do these kinds of things. But these don't need to be expensive. This is just an ordinary school, it used to look like this, these are my PhD students who had a project in Espoo near Helsinki.

These are IKEA furniture and recycled furniture, and then actually the technology is not very expensive because everybody can take their mobile phone or their own device from their pocket, and then people are saying, "But not everybody has a mobile phone." In Namibia, mobile phone coverage is 117%. I would believe that in Finland is about 250 %so that each person has 2.5 devices. You must have some kind of phone, even if people in Africa would have, a phone or some kind of device that you're using.

The department of Mathematics was flipped. Mathematics is very threatening, the professor is drawing on the blackboard, and nobody understands, or half, 10% understand who are gifted, and then the others go anxiously calculating to their homes, but they always learn from the net, but students come to the department of Mathematics to solve problems together, and these are fourth year students who are guiding this.

They come every morning at nine o'clock and start calculating, and they calculate the whole day, and they really like it, and even girls have started liking Mathematics because they are getting rid of that believe that it's for guys only. You can see who is teaching Integral and who is teaching vectors, and what, you know when the teachers are present, and what is lovely about this is that all the walls and tables, because we didn't have money, they didn't have money for small rooms for everybody. Only first-year students are in the small room, and the others are in the corridors, and all the walls of corridors have been painted with this kind of painting and all the tables. They are just, they have formulas everywhere.

It used to be called cheating, but now it's called collaboration.

They can just leave this here and the next team comes and, "Oh, how did they solve this problem. How interesting, how would we approach

this one,” and so on. What do they mean actually? My conclusion is, I’ve noticed these are not Finnish problems, these are global problems. I’ve been talking to people in Africa, Japan, Taiwan, London, Spain, Catalonia, wherever. There is this widening gap between schools and outside world, and the most difficult problems are in those countries who been doing well in PISA results because they’ve had this illusion that they don’t have to change anything, which is a very dangerous thing.

Technological things, digitalization, automization, they are changing our societies and we need to change our ways of teaching and learning. Intercultural issues are very important. Estonia, Finland, Taiwan, Singapore, they are not even countries, they are like country clubs but imagine Canada. Canada is always in the top ten, and it’s the most intercultural country in the world. Totally peaceful, I’ve been living there, I was never afraid of any people coming from any other culture, and they are very much investing in home languages, so that everybody, for instance, there is a Toronto Finnish Language School.

My husband went to drivers test, and they asked, “What language do you want your questions in?” He was just joking, he’s, “In Finnish,” Okay, “Here you are.” I don’t understand how they do it. But we should go there everybody and study. Finland is boring. It’s very easy for all these blond people. We have like 10% immigrants, very homogeneous. The main problem is to reform our teacher education and continuing professional change for teachers to make for this change. Those who don’t have trouble in keeping up with the technology, pedagogy, ways of thinking or dramatization, internet of things, augmented reality, all these. Those who don’t have any trouble with them can raise their hands. I couldn’t. I have more. Oh, there are my friends from Taiwan but this is the worst ghettos I would say townships.

I’ve seen various student centers and wonderful pedagogy and the worst places like in Orange Farm which is like Pretorian slum and these are young people who were trained to make web pages in two weeks and 10 of these people already has a job. Before that, they couldn’t pay 60 Rands to go to Johannesburg for work, but now they can work in their own township. This is not something that has to do with the Western world, it’s also the major change that we can do in Africa and in other

countries is also to help students to become digitally-engaged and create jobs for themselves and for the others. This was on the wall of that center. “Be the change you wish to see in the world.”

We always have these excuses, “We don’t have computers, we don’t have this, our study plans blah blah blah.” But actually when I go to Africa and they are doing much more advanced things than we are and I really feel ashamed. Always complaints we have in Finland, “We don’t have enough money and we don’t have this and we don’t have that and government is cutting and blah blah blah.” If you don’t have any money you just have to be creative. We are building these schools in Africa and they are sustainable and so on.

Here is some information about our projects and I got a bit carried away because as you know this topic is close to my heart and I somehow was inspired with this Catalanian speech that sounds so beautiful.

Questions

Is the PISA report an out of date way of rating educational results?

What is interesting, Finnish students are doing well in very many things that are not taught at school like reading graphics. We are not actually teaching it. For some reason they are good, probably because they are using a lot of Internet and they are looking at different kind of quizzes or what. Many mathematicians are complaining that it is not actually measuring mathematical skills. They are very pragmatic problems. Maybe PISA results are closer to, I don't know pragmatic things, but I don't think any test could capture such complex things and I think PISA has gone –It's been very dangerous in Finland. I've been saying we have PISA in our heads and we should get rid of it.

If you look at the list of who is doing well. They are actually not even countries, they are cities like Shanghai or Singapore or Estonia with just a million people. They are very compact legal societies but what was interesting with the latest results, Estonia is one of the most digitalized countries in the world. They have even digital voting systems that even works. We have much to learn from other countries. The problem with this kind of PISA thing is that it reduces the whole educational system into some kind of test. For us it's been good because maybe otherwise you wouldn't have invited me here, I would be the some weird West Mongolian person who can stay north.

I'm grateful that for some reason we are doing well but it may not really measure... there are so many things but one thing is that those countries are doing well in PISA who have little differences between rich and poor people. The most equal economics are usually doing well and the more you invest in education, the worse results you get. Like Norway

is investing three times more than Finland, but they are getting worse results for instance. There are all sorts of societal things. Canada is a very nice and very flat society, no super rich people, no super poor people. Usually those countries do well, I don't know why, I'm not a sociologist.

How can we kick off profound changes in teacher training?

Transforming teacher education is like changing a graveyard. It was even easier trying to change a very well established medical school. If schools are very slow to change, teacher education departments are even slower usually because they are not linked to international research and learning. In many countries like Germany, France, probably in Spain there is too much literature that is national and there is too little international evidence about how people learn. I think this research based teacher education is very important and usually the models are most advanced where there's some educational psychology basis or more holistic view so that you are not doing research on didactics, it's not about how we are teaching but it's more about what kind of arrangement helps you to learn.

That's why I think international research community is very important. They are trying their best in the United States but that kind of post-truth society has difficulties. My colleagues in the United States are desperate at the moment. Many of them are moving to Canada and now it's getting even more difficult to do anything at schools, probably they start denying evolution theory again or something. The next question was how to change your thinking. When I went to medical school and I was asking my colleagues, "How can you change medical teachers' ways of thinking about learning?" They don't have any pedagogical training, right? They told me don't start talking about theories of learning, do something that works and then if they ask, "Why does it work?" Then explain.

Sometimes it's so that if you make people change their ways of behaving, they start changing their thinking. Like when we changed the interaction in Minerva Plaza people got the experience that I learn more effectively this way, I'm more engaged, I have this interesting question

and it catches my interest and now I'm Googling to find more information and who is finding first and time flies. And why would I sit down and listen to boring lectures from Professor Lonka anymore? What I'm trying to do, I've published about how to make the mass lecture into an engaging learning experience because we have 400 people (at our school) and we cannot afford to have everybody in a small group. What we are trying to do is to make mass education more engaging and usually these blending learning solutions help.

But I think it is not always that you first have to change your thinking, but you can't force people to come out from their comfort zones because then you stop learning because then you start defending, but you can stretch the comfort zone so that people don't even notice that they are interacting in a new way. And then they notice that they start first changing their way of communication and then they start changing their way of talking and then they start to change the way of what we call knowledge practices. But then there are so many institutional routines that prevent that - examinations, lectures, seminars. The examination assessment is the tail that wags the dog, we have to change the assessment system.

What role do management teams play in the change?

Actually we have published about that. I have one PhD student who is looking at how innovative schools near Helsinki have been led. He did his master thesis on that. One person can never change anything, if the Principal is alone. In those schools that managed to change they had shared leadership so they were like a team of leaders. The Principal and four colleagues and then they actually started involving students in the process. Actually I was present in that school where the Minister of Education was visiting that school but the ninth graders had organized the whole thing. The teachers were just assisting. I think that kind of hierarchical leadership can never actually (succeed). You cannot tell people start changing and if you don't change then you have resistance to change and you have to be eliminated or something.

Shared leadership and promoting students' agency so that they get meaningful tasks to do so they feel that they have agency for their own learning, and teachers have agency for all these collaborative study plans that have to be put into practice in each Finnish school.

It's impossible for the Principal to do it for the teachers, but we should be more radical in involving the students and pupils as well because they're surprisingly smart and now the latest trend is trans-generational learning. Which means that I can learn from my students and my students can learn from me but about different things. It's very refreshing to learn new things and it's very refreshing for the professor to be totally confused every day. Then I won't get Alzheimer's.

Do we need to change curricula in order to introduce change?

Curricula in Finland and many other countries are too packed and they're too packed with facts and these things, that people forget in a week. We have this illusion that when we have taught them people will have learned them.

We have this illusion that lecturing is effective but it's not, you will remember 10% of what I said today. Probably those things that were controversial or touching your own heart. We have to give up this illusion that running through curricula is any good. That I've done my duty when I've taught it because it's not, it's how I activate students to study more.

Research is showing that students who are interested spend three times more self-study time than the others and they got the best results. If you trigger interest and you maintain interest, you motivate your students to do the work, it's not your work anymore and it's much more efficient.

Finnish people are very critical about PISA, every time they publish this news we're saying no, it cannot be, there must be something wrong with this stupid test. That's a healthy attitude because if we stop changing our curricula we start going back. We had a period of time when I was worried about PISA too much, but thank you for your comment. I'm happy. Maybe you entered in schools that are advanced, not all of our

schools are. There are lots of quite traditional schools that are not so advanced.

We need to make teacher training more engaging. What we're now doing is using this engaging learning model for teachers and going to school so they don't have to a course and take a course, but we can have a blended learning system so that they can, the whole community in the school can learn rather than go to separate courses. I have no magic bullet for that.

How can we include students who have problems acquiring technological devices?

The problem is that it makes things very unequal if the school is offline time and then there is huge variation in families. Even in Finland we think that you must make it more equal so that teachers are able to digitally engage the students regardless of their home. The problem is that the conception of the digital native we think that they're very savvy with technology, but actually they're used to use it for entertainment and outside school only. Even students in poor families have mobile phones and they're using them usually outside school but they're never used in school, and the students don't learn how to use technology for learning and working. Then that's a problem. You're very right about that.

Even in Finland we have the same problem but then if you're a less homogeneous country with huge variation.... I would like to really go to Canada and see what are they doing.

Does the use of technology in the classroom reduce the risk of bullying?

We have this social innovation called [...] which is a programme to prevent bullying. Bullying is a symptom, is like fever. It tells that the school is sick. But bullying is also enhanced if the teachers don't know what students are doing online. Adults don't have a clue what young people are doing there, though we should go there with them. In Finland

there are policemen who are online policemen who are helping students in cases like that. If the parents are not savvy enough to go to social media or to follow something, rather than prevent bullying we should promote collaborative peaceful classroom work and make students so busy with knowledge and so engaged that they don't have time for bullying [laughs].

But usually when students are bored, there is actually research on boredom that's my latest research topic, it makes students very aggressive. You know this old psychology frustration aggression hypothesis. You frustrate students they're passively sitting there and they're burning to do something active like hitting somebody [laughs]. This kind of pedagogy that makes students passive objects, frustrates them and promotes aggression I would say and they won't learn to regulate their behavior.

How can motivational learning from outside school be brought into the classroom?

How to bring the social capital from outside school into the school and actually there's a beautiful doctoral dissertation, you can find it online. You just go to ethesis.helsinki.fi.

That was about bridging between informal and formal learning, beautiful work by [...] but I will tweet the link. For instance, if you start physics lesson with this engagement learning model asking when your parent takes something from a freezer why does it melt faster in lukewarm water which is room temperature rather than on the table and then you ask how come people go to a sauna and it's 90 degrees and they're not burning, but if you throw them into boiling water they die. If you have a class on how heat is kind of, what is the physical term, thermometers and this things Thermodynamics.

What we're doing its phenomenal based projects, molecule cooking [laughs]. You can integrate physics and chemistry into home economics. When it's a meaningful context and everybody's curious about microwave ovens, how it makes molecule go faster, how heating makes the molecules

go faster. There are thousands of ways how to trigger interesting questions in students' minds or make them come up with examples and then they can even have a competition whose example is most engaging on the topic.

There are endless possibilities in bringing the outside world into the classroom without any sophisticated technology.

My daughter was asking, "Mother what did they do before Google?" I said, 'There were encyclopaedia,' and she asked, "How did you put it in your handbag?" Why don't you just give them mobile phones and say now you have 10 minutes to figure out this interesting thing like Napoleon's war and who finds the most interesting and critical answers, looking at those answers because Wikipedia is not always reliable, who finds the most reliable answers. Then you can make them talk about how reliable the sources are and why. Instead of saying put the mobile phones off.

Do you know it's not that difficult actually, but I know it's chaos and then you need a totally different type of classroom management. But who of you would be loving to sit seven hours and listening to my talk? I mean 45 minutes is okay, but nobody would sit the whole day. Everybody who's sitting in some leadership seminar knows how terrible, boring even for adults, imagine active children who are supposed to run around. They can stay there even for hours engaged in something that they are doing. They're not running around if they have meaningful things to do.

What role does technology play in including students with special needs?

But then special needs kids...we have a very inclusive classroom, and my husband is a class teacher and he has all kinds of Special Ed. He has immigrants who don't even speak Finnish, and all kind of circus going on. He just has to improvise all the time. But the last thing he would do is try to make them sit silently and listen to him. That's hopeless.

They can't take that for 10 minutes. He takes them out actually. Outdoors usually.

How should assessment be carried out?

Are you measuring what is the percentage of facts that people remember after my talk or how their thinking has changed? We very much talked about authentic assessment, like we are changing our matriculation examination. We are digitalizing it so that in order to understand Physics you can simulate something. Have a car crash and poof. Then you have an authentic thing, and then you start measuring velocity and things like that rather than, there are lots of people who are saying $F = MA$ and they don't have a clue what that means. There's always some very abstract thing going on and dropping. Then when you start talking about cars and seatbelts, that's much more authentic assessment when you make people put those formula into action. Looking at how they understand science concepts, and how their understanding before the Physics class has changed into some new understanding after they have learned about Newton and his laws.

What has been the best learning project of living lab Minerva plaza for teachers?

When I started for instance, this is already an old version of [...] we already have more advanced. All these smart boards are not very needed anymore. You cannot teach technology by thinking that this is going to be the thing but people are using art in the school because they are going to graduate after five years, and they are going to stay there for 20 years. Everything I'm having in Minerva Plaza is going to be old-fashioned in two years.

What I'm trying to say, the most important lesson is our future teachers to learn constantly to take new devices, or new tools, or new technologies and practice. I promise you they are getting more and more increasingly user-friendly. I say in Minerva Plaza, there cannot be anything that I couldn't use. I'm an immigrant. It has to be blonde-friendly. For ordinary teachers, don't try to make teachers nerds. I always tell these computer nerds. I cannot use it. Probably my students, even if they are

much smarter than me, it's difficult for them. Let's make user-friendly solutions that are easy to use in the classroom. We can alienate people with non-user-friendly systems very fast. Also, like what happened during my lecture, you just have to live constant failure. Every time. That's what we do in the research and in real life. You fail like 10 times a day with your project, and you just have to get up and find a new solution, and ask for help [laughs] and consultation.

That's the most important lesson. Learn how to ask for help. Learn teamwork. Learn how to be bold and have this growth mindset. If I'm failing now it doesn't mean I'm a loser. I'm failing now, I'm thinking how successful I'm going to be tomorrow. Because the more confused I am now, the wiser I am tomorrow. We're doomed to be totally confused every day. It means we are going to be very smart.

About the author

Kirsti Lonka has been Professor of Educational Psychology at the University of Helsinki, Finland, since 2005. She is also Extraordinary Professor at the Optentia Research Focus Area, North-West University, Vanderbiljpark, South Africa, and member of the Advisory Board of the Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology.

She is currently working on innovation in higher education and in engaging learning environments (ELA).

She has been a founding member of the Teachers' Academy of the University of Helsinki since 2013 and also their first president (2013-2014). She is also director of the Research Group of Educational Psychology and the Principal Investigator of the project "Mind the Gap - between digital natives and educational practices", funded by the Mind Program of the Academy of Finland (2013-2016).

Her latest projects are 3Spaces, Sustainable Education Design and Engaging Working Culture. She was previously involved in the learning environments study, the RYM Indoor Environment project, from 2011 to 2015.

She was also Vice Dean of the Faculty of Behavioural Sciences at the University of Helsinki (2011-2013), Foreign Adjunct Professor at the Department of LIME, Karolinska Institutet, Sweden (2007-2011), and Visiting Professor, University of Groningen, the Netherlands (2007-2008).

She has also worked as the director of the Development and Research Centre, Faculty of Medicine, University of Helsinki, and as professor of Medical Education at the University of Helsinki. Under her management, the medical programme underwent changes to include problem-based work.

Kirsti Lonka is a popular keynote speaker around the world. She has published numerous articles, conference papers and book chapters. She has also published numerous text books and popular writings. Her specialities are higher education, medical education, teacher education, and postgraduate education. In the area of academic writing, her work has focused around conceptions of writing, note-taking, the writing process and writing across the curriculum to develop writing as a learning tool.

Professor Lonka is active on social media: @kirstilonka (Twitter), Facebook, LinkedIn and Instagram.

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