

CHALLENGES FOR TERTIARY EDUCATION IN THE 21ST CENTURY

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A few years back, in the middle of a December blizzard, I was driven from the airport to this location where I saw cranes and hundreds of workers working in the cold and the snow and it was difficult then to imagine how the dream could become this beautiful reality. So it is a great honor and I am grateful to Nazarbayev University for inviting me back to participate in this conference.

Yesterday when we had our preparatory meeting about this session, I realized that I would have to speak after three distinguished scholars and I was the only non-academic in this group, so that made me a little bit nervous and I must confess that I felt the need for some help to gain inspiration for my speech today. So I walked around in the streets of Astana and I found help with this fortune teller starting sharing with me her predictions for 2012. As you know the Mayan calendar has very gloomy prospects: perhaps, a Black Hole could swallow the earth or aliens could invade our planet and wipe out human civilization, or the planet's magnetic poles could be reversed, causing general mayhem and certainly confusing the penguins. But I interrupted her and told her that this was too depressing, please tell me something nice about the future of tertiary education.

And this is what she told me.

In the future, it will be compulsory to go to university. Universities will recruit their new students on Myspace and Facebook, and in countries where it's difficult to attract engineering students to study Engineering, they will go straight to kindergarten to start motivating them. When they enter university, new students will get a free laptop, a Blackberry, an iPad and a Kindle with all their text books.

If you need financial aid, you will participate in an auction on eBay to get your scholarship. In the future students will commonly be enrolled in two or three universities at the same time studying towards a common degree.

No more emails in the future because it's too slow. We'll be commonly using only Myspace, Buzz, Twitter, Facebook, Hi-5, Blogger, Lifespace, etc. Students will take open internet exams and the validity of their degree will be only five years.

And bad news for those of you who are still lecturers - you will have to re-do your courses every three years. But don't worry, it will be much easier in the future because you'll be giving only five minute lectures. Most courses will be online and if a student needs some help, he or she will call an 0800 number to Bangalore for online tutoring.

In the future it will be cheaper to build universities because we will have no more physical libraries or labs; it will be all i-labs and e-libraries. Universities will not recruit any professor who has not studied overseas. And once your graduates leave university, if they don't find a proper job within six months, you will have to reimburse them the costs of their studies.

Bad news on the financial front, of course. Public universities will receive only 10% of their income from governments, but not to worry because you will be so successful in raising

money that you will be telling the philanthropists out there, "That's enough for this year; come back next year."

Vice Chancellors will be earning £1,000,000 a year. However, your salary will be indexed to your ranking, going up and down with your ranking result.

In countries where English is not a native language, parents will have surgery performed on their young children to cut the little skin that links the tongue to the mouth to improve their English language pronunciation. Obviously my parents forgot to do that to me!

And lastly, in the future, those of you who are proud graduates with an MBA, forget about it, because in the future the 'in' degree will be the MFA, the Master in Fine Arts, because creativity will be so important.

Now you think that I've been telling you science fiction stories. Believe me, each and every example that I gave you is something I came across throughout my travels all over the world and I believe that these examples are symptomatic of a revolution that tertiary education is going through. And so the question before us is to ask ourselves whether our tertiary education systems are ready to face this revolution. To start answering this question with you tonight, I have divided my lecture into two parts. First, I want to remind ourselves about the importance of knowledge; then I want to see what it means in terms of new education needs and practices, some of which have already been evoked by my colleagues here.

Importance of Knowledge for Economic and Social Development

So let me start with the importance of knowledge. A few years back, colleagues of mine at the World Bank looked at two countries that used to be at the same level of economic development in the early '60s - South Korea and Brazil. But look at the difference today. South Korea is doing so well and Brazil is so behind. They tried to do some adjustments to compensate for differences in investment in both physical and human capital and that makes it slightly better for Brazil. But still we have this huge gap which they attribute to the way South Korea, much more than Brazil, has harnessed knowledge for its development. And indeed some of you may be driving a Kia car or Hyundai, you maybe have a Samsung cellular phone or watch TV at home on an LG screen, but how many Brazilian products do you commonly have?

And it is interesting to look at the difference in human capital development as the following graph shows. This is the education attainment of the adult population. If you look, for example, at the bottom - 1960 - in red you have the proportion of adults who had completed only primary education, in blue we have those who had secondary education only, and in green those who had achieved tertiary education. I think it's interesting to see that, back in the '60s, the education structure of the labour force was pretty similar in both countries with the majority of people having only primary education. But if we fast forward to 2010, look at the change. Brazil has improved, but we still have a majority of adults with only primary, and then most of the others with only secondary education. But look at Korea, where you have now the majority of adults with secondary or tertiary education.

A few weeks back, the Prime Minister of Ontario travelled to the US and he gave a speech and, at the end of the speech he had the following words: "If you think about the world we live in today, it's a world where you can borrow your capital, copy your technology and buy

your natural resources. There is only one thing left on which to build your advantage, build a strong economy and society, and that is talent." That's the only competitive advantage nowadays.

A few years back there was a commission on the future of skills in the US and it looked at the very generous distribution of labour that they proposed. The US will focus on creative work, that's R&D, design, marketing and sales, managing the global supplies chain and, for the rest of the world, we will be confined to routine work, whether we do it ourselves or whether we use machines to do that. Do you like that vision of the world? I don't.

Let me share with you another story to illustrate the importance of knowledge. In Finland, 500 km north of Helsinki, there was a small city called Oulu in the middle of the forest. The main company there used to cut trees, making paper and cardboard. But, back in the '70s, the CEO had started to get worried about the future of his industry and so he challenged the Government - 'If you established a polytechnic university in Oulu, I commit to investing in modern labs and to bring more private sector investors.' You can imagine that professors in Helsinki were not so keen to move to this small city in the middle of nowhere, but the Government took up the challenge and established a university in Oulu and today, if you Google, you will see a giant website - the City of Oulu and the University of Oulu - because their development has been so closely interlinked. Now, which company had the CEO with a far-fetching vision? You may have heard about them - they are called Nokia. They moved from being a company producing paper and cardboard and cables to becoming a world leader in electronics, contributing 20% of Finland's balance of payments and two-thirds of the country's R&D funding.

I come from Morocco, at the crossroads of the Mediterranean Sea and the Atlantic Ocean, and we have lots of wind, and I remember these small windmills all over the countryside when I grew up there, but we haven't risen to the task of trying to use our wind as other countries have done, where you have wind factories or wind farms. Now it's interesting if you look at who are the leaders in producing windmills today. It's not the US, it's not the UK, it's Denmark with Vestas, the leading company. Actually they produce now 20% of their energy supply out of the wind. And who is coming up big time? India and China and Spain.

And it is not only about using knowledge for economic growth, but also for resolving daily problems, especially in developing countries. Look at this magic new invention called the LifeStraw which allows you to transform dangerous water into potable water immediately. Or the O-Drum which transforms the traditional chore of taking water from the well to the village into almost a game, or look at this 20 dollar artificial knee which allows a person who is not lost to limb to walk just like a normal human being.

And the last point about knowledge is, as was mentioned by the Minister earlier today, the acceleration of speed of creation of new knowledge which makes it challenging for universities, because in many disciplines what the students may learn in first year, may have become obsolete by the time she or he graduates. To illustrate that point, can anyone guess what I am showing on this slide? This is the year 1956, and we see the first hard drive weighing 2,000 pounds and so powerful it can stock 8 megabytes of information. Surely you can appreciate your little usb drives. And so it challenges us to think how we prepare our students for this kind of society.

Changing Education Needs and Practices

Obviously we will need to impart new skills to our students. In the same way as in the industrial revolution there was a worry that new machines in textile industry will replace the workers. Today we wonder whether that is going to happen with all this robots and intelligent machines. A recent study from the UK called "the Hourglass Economy" shows the contraction of middle wage routine jobs and the expansion of high wage abstract non routine jobs. The conclusion in that study is similar to that of recent book published in the US, a study by professors Murnane and Levy from Harvard and MIT respectively. What they did was to study the evolution of tasks in US first between the late 1960s and the late 1990s. Their book gives both good news and bad news. The bad news is that indeed the machines you can see on the lower right hand side are replacing human beings for both routine manual and routine cognitive jobs.

But there are two types of new tasks that are still only performed by human beings. One is what they call expert thinking; the other one is complex communication. What is expert thinking? It is the ability to look at patterns, complex patterns, to make sense of them and to propose a course of action. I think, perhaps, the best way to illustrate that is to look at the role of a medical doctor. Medicine has changed a lot, much more than education, and we even use robots. Here we have a robot that allows you to do telemedicine. The doctor is 2,000 km away and can interview a patient at a distance. However, we have many more sophisticated machines to do blood tests, we can do CAT scans, MRI, etc., but it's still the human medical doctor who looks at all the facts and who puts them together, makes sense of them and says, "This is what you have and this is the course of action that I recommend to cure the patient."

Now are we preparing our students well for this expert thinking? Many countries in the world, including Kazakhstan, participate in PISA, this test administered to 15 year-old students in secondary schools. It doesn't measure how they can memorize, but their critical thinking and ability to reason. The results are really of concern, because even in the top performance countries like Finland or South Korea the results are not good for 20% of the students. This is an exam on a scale of 1 to 6, but if you have less than 2, it means that you haven't mastered the basic skills. And in developing countries we see here statistics from Columbia or Brazil; more than 80% of the students are not there. And if they are not well prepared in high and secondary schools how can you expect them to do well in higher education.

The other type of skills that I mentioned are complex communications, the ability to explain complex situations, complex phenomena to persuade to convince, sometimes to communicate with people from different culture or people who are distant, you know, virtually. Now I could not find a lot of hard evidence, so I turn to our cousins the dolphins and here is what they have to say about human communication. "Although humans make sounds with their mouth and occasionally look at each other. There is no solid evidence that they actually communicate among themselves." Indeed when we read the paper every day and watch the news what do we see, if not images of war, violence, civil strife, poverty, inequality, which make me believe that our education systems fail in helping us learn to communicate effectively.

What are some of the new competences that we need to impart? A few years back a friend of mine professor of University of Hong Kong interviewed the Samsung CEO for cellular

phones, asking him what kind of training do you look for among your future candidates and he was surprised when the CEO said "I am not so much worried about their skills in engineering or in various technical..., what is missing today is the ability to be creative, because today increasingly what distinguish various high tech product. It is not so much high tech dimension specificity, but perhaps the design. This is why you can buy a product cellular phone or look at this new Aura, may be you want to Giorgio Armani Samsung, look at in Shanghai you can get this beautiful Vertu cellular phone, and those of you who have teenage daughters will identify with this model. And look at this elegant lady with matching handbag, actually it is not a handbag, it is a laptop. We also have beautiful laptops for us men, we have the Ferrari laptop for those of you who are interested and if you don't like Ferrari not to worry, how about Lamborghini? And please next time you buy a helicopter make sure you get the Versace designer version. Some of you may remember using this standard issued laptops very dull looking and they have not to compete to hire graphic designer to make sure they can compete effectively with other brands whose name I will not mention.

So it is all about creativity. What does it mean about the way we teach our students? They must learn to invent, to experiment, to think out of the box, to take chances to break the rules to make mistakes and to have fun as you do that. And I know this is happening at Nazarbayev University, but believe me in many universities that I have visited, it is still all about teaching and learning as we have done for hundred years. Now do you remember the design that I showed at the beginning, well the beauty of knowledge economy is that any country can decide to participate in a knowledge economy. Coffee growers produce coffee that is sold all over the world and that represent a 70 billion dollars industry. Do you know how much they the countries that export coffee get? 5 billion dollars out of that. And today the digital economy already represents more than thirty billion dollars.

As observed by some of the speakers already, now it is all about lifelong learning. We have to start early and we can continue throughout our life. What does it mean for the shape of university? I want to recur point made earlier by Michel. If you imagine the shape of today's university and the universities that existed in the past, they have the shape of a pyramid where most of the students are high school graduates and then you have increasingly a portion of graduate students.

But I believe that the university of tomorrow will have the shape of a star, where the undergraduate students will be just a small proportion, same with the graduate students, but increasingly it will be about providing continuing education and what I call career change studies, because students, professionals as they move from one type of work to the other we need to be retrained. So increasingly it is going to be about learning to learn and also unlearn continuously.

We often celebrate Steve Jobs or Bill Gates as famous dropouts of university. Another one of my favorite dropouts is Edwin Land, whom some of you may remember founder the Polaroid technology. He once said "it is not that we need new ideas, but we need to stop having old ideas". So we can take advantage of new pedagogical approaches, where we focus on the needs of the learner, not what the professor likes to teach, where we can use a lot of modalities to teach and to facilitate learning in a more interactive and collaborative learning, where the students do not learn any more only from the professors, but increasingly also from their peers, where you can learn when you want and where you want provided you have a good internet connection.

I don't know if anyone can guess what you see on the picture, this is Duke University Faculty of Nursing on Second Life. One of the top business schools in Europe is INSEAD, and they have two campuses, one in France and one in Singapore and this is their virtual classroom on Second Life where students who are enrolled in Singapore and in France can meet and exchanges and study together at the same time. And this is not virtual anymore, this is the Technology Enhanced Active Learning classroom at MIT. Where there is no more teaching of basic physics. The students go through the textbook on their own, and when they meet in the classroom they do works as a team, trying to solve problems to verify that they have acquired the necessary notions and professor there is just a facilitator and they use also second year students as tutors to help in their learning experience. This is a game chemistry software from Carnegie Mellon Open Learning lab, where a game-like approach is used to make learning fun for the students, making it like a mystery.

This is an English language classroom in South Korea, where the teacher is a robot, and the students were asked "Do you like having a robot as teacher"? They said "Yes, better than the human teacher". Definitely, why? Two reasons: one, the robot "never makes fun of us" and second, "the robot never screams at us". And this is a medical robot, who can speak and you practice injections and if you do it well, she will thank you in a sweet voice. But is you hurt her, she will tell you in terms that I cannot repeat here what she feels about your new skills. As Peter Knight said in 1994: "in the early 21 century people will be able to study what they want, when they want, where they want and in the language they prefer, electronically."

Conclusion

Now to conclude, because talked a lot about the future of tertiary education, I want to share with you my three favorite quotes about the future. The first one is from William Gibson, a British science fiction writer, who wrote: "The future is already here, it is just unevenly distributed". And then we have Paul Valery, the French philosopher, who wrote "The trouble with our time is that the future is not what it used to be". But my favorite one is an optimist one from Alan Kay, who said "Do not worry what anybody else is going to do, the best way to predict the future is to invent it". Alan Kay invented the windows environment on Macintosh in 1991.

But with the future we should not forget the past. 200 years ago in Cambridge, Massachusetts a math teacher entered the new school he was shocked, but what he saw that he wrote a Letter to his wife that evening said "Dear, you cannot believe what I saw. There was new classroom and they had a black board and piece of cloth and some chalk. And I asked myself what is this for" and now we know the blackboard became the main pedagogical support in the following 200 years. And the question before is whether the internet and computers will have such a revolutionary impact on teaching and learning as the blackboard has.

A few years back Arthur Levine, president of Teachers College at Columbia University in New York predicted the disappearance of what he calls the "brick" university, soon to be replaced by the "click" university. I am not sure there will be such a drastic change, but definitely today universities are both brick and click. But that means that we know how to use the internet and these interactive approaches. We should not repeat the error of those who invented the steam engine. For the first train that they put together they just took the horse driven carriages and put them on the rails. Now we really have to think about the different

concepts, and for that we need to bridge the digital gap. Look at the contrast between the school bus in South Korea when the students already on their way to school are learning fast and this bus from India.

I come from Morocco where we have this beautiful animal, the gazelle, which has a terrible life, which I want to use to illustrate what it means to compete in the learning society. Every morning the gazelle wakes up thinking today once again I need to run faster than the fastest lion, if I don't want to be eaten up alive. And now does the lion have a better life? I am not sure because every day in the morning the lion gets up thinking today what's again I need to run faster than slowest gazelle, if I don't want to starve by the end of the day. And moral of this little anecdote is that it doesn't make a difference. Whether you are a small university or a big university, a rich university or a poor university you cannot afford to stay put, you need to change with your times. And I know that to some of you it may sound unpleasant, unfriendly. It is a tough world we live in. But this is only world we have. So we just can't seat back and do what this Chinese proverb says "He who waits with mouth open hoping for roast duck to fly in we have a way long wait."

If I can leave you with only one message today, it is the following, "don't allow others to dictate your future, you must develop your own vision" and always remember the wise word of the Roman philosopher Seneca, who told us more than 2000 years ago that there is no favorable wind for those who do not know where they are going.