

THE ROLE OF TERTIARY EDUCATION IN ADDRESSING THE GLOBAL SKILLS CHALLENGE

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Introduction: Change and Disruption

It is a great honor and pleasure to be back at Nazarbayev University. It does not often happen, at least in my field, to have the opportunity of seeing the results of one's work. I feel privileged because I was invited to participate in the initial discussions about the establishment of Nazarbayev University. I remember a very cold December month being able to visit the construction site at the beginning of the project. So being able to see today the impressive progress achieved by Nazarbayev University is a very emotional moment for me.

Remembering that day of winter many years ago, I would like to show you the picture of a beautiful mountain covered with snow, which looks very peaceful, very tranquil. But if we get closer to it, we might hear some loud rumblings announcing an avalanche. This is what is happening in higher education today – many changes, many threats, and many risks. In fact, some people have announced the demise of traditional universities, soon to be replaced by the MOOCs, for example. I am not so sure that universities are in danger to disappear. But certainly they are under siege.

I see around us many factors that I would call rupture factors because they are indeed changing the environment in which universities operate. Let me mention a few of these disruptions. First, we now live in a world that is more uncertain and unstable than it ever was. Two decades ago, things were much easier. Young people knew what they wanted to study and what kind of job they wanted; the connection was clear and direct. But today the big challenge for students, for companies and even more for university leaders, is to train people for jobs that do not exist yet. How do we do that? That is a big challenge to guess what are the right skills for the twenty-first century.

We also live in a world of increased insecurity. Our world is not what it used to be, and sadly education institutions are also suffering. If you think about 2014-2015, two hundred girls were kidnapped in Nigeria; 43 students disappeared in Mexico, and a recent attack at a university of Kenya resulted in hundreds of deaths. The world of higher education has also become more precarious, especially for the academic profession. In many countries today more than a half of academics do not have a regular contract.

The other source of disruption is globalization. Did the Shanghai rankers realize, back in 2003 when they unleashed the first Academic Ranking of World Universities onto the world, how much havoc they were going to create, how many nightmares they would provoke among university presidents? A few years back, I was invited by the French Senate, the first time that my professional world intersected with the world of politics. The session was called `Forget Shanghai`. Of course we cannot forget Shanghai and the need to make universities accountable for their performance.

A few months ago, I was visiting an old friend who is the registrar at Oxford University, and he was telling me "You cannot imagine how much more difficult it has become, even for Oxford, to attract the most talented academics in the world". Today the top universities all over the world, from the US to Australia, from Singapore to Kazakhstan, are competing to attract global talent. At the same time, the sad reality that is hurting public universities all over the world is that they are receiving less and less public funds. In the US, for example, between 2008 and 2013, we have seen a sharp decrease in 48 out of the 50 states. I am told that even Kazakhstan is facing this harsh reality as a result of the fall in oil prices.

Ironically, at the same time that governments are giving their universities less money, they are asking them to be more accountable. Mind you, sometimes these demands for accountability are justified because there seems to be a big gap between what universities perceive they are

doing well and what the rest of the world thinks. A recent Gallop poll in the US shows interesting findings in that regard. University provosts were asked: “How well do you think your university is doing?” 94% of them responded that they are doing great. And then the students were asked: “Are you happy with the quality of education at your universities?” The response was that only 14% are highly satisfied. And then when employers were asked the same question, only 11% were satisfied with the skills of the graduates whom they hire.

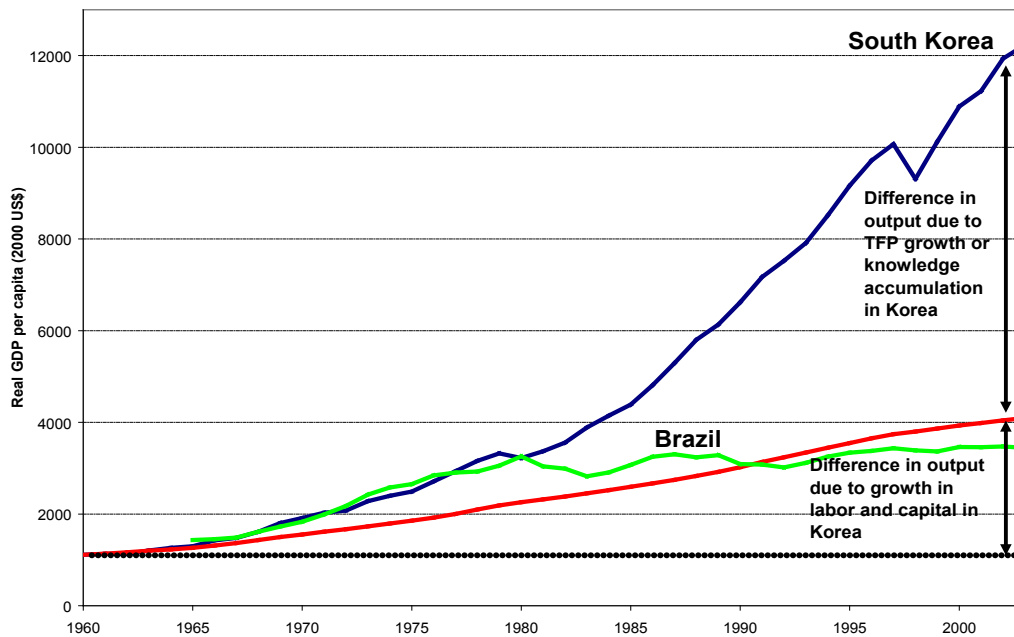
The last but not least disruptive source of change are the Internet and the new communication technologies. In the late 19th century in France, when teachers were asked what they thought was going to happen in the classroom by the year 2000, they had this image of knowledge going down through a machine and being fed directly into the brains of the students... Today ubiquitous access to all the information available on the world wide web has become a reality.

Against this background of disruption factors, I divided my presentation into two parts. The first part focuses on the importance of knowledge and skills for innovation. The second part looks at how innovation influences the way skills are acquired in universities.

The Role of Tertiary Education in Support of Innovation

A new Prime Minister took over in Norway at the end of 2013, Ms. Erna Solberg. In her inaugural speech, she warned her citizens: “Oil and gas represent the past! The future for Norway is knowledge, and that is what we need to focus on”. Figure 1 illustrates the importance of knowledge with the comparison of two countries, South Korea and Brazil, which were low income countries at the same level of poverty back in the 1960s, but have followed very different paths in the following decades.

Figure 1 - Knowledge as a Key Factor in Income Differences between Brazil and the Republic of Korea (1956–2000)

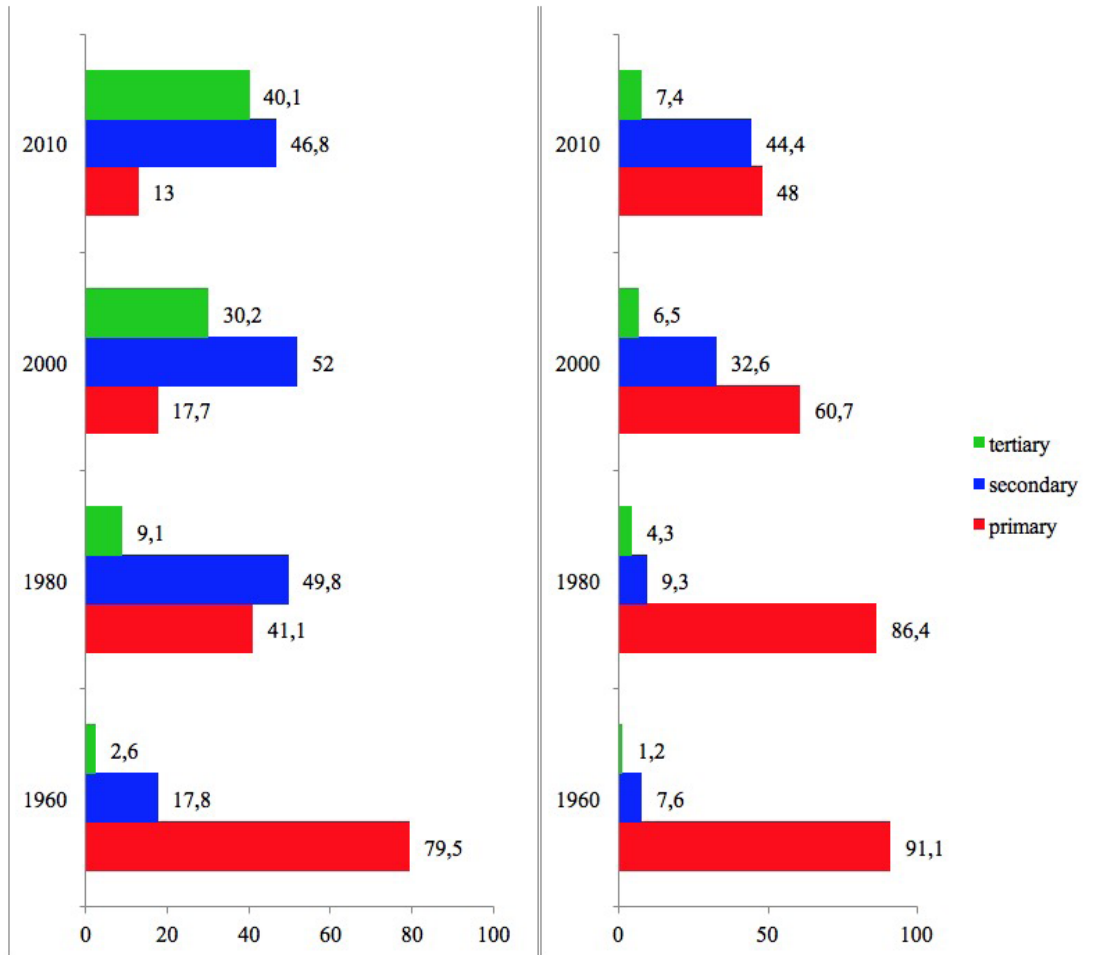


Source: Rodriguez et al (2008)

To complement this picture, it is useful to compare the evolution of educational attainment in both countries. Figure 2 shows the contrast between Korea, where the proportion of adults with a tertiary education qualification grew dramatically, and Brazil where investment in secondary and tertiary education was much less significant. While it is impossible to demonstrate a strictly causal relationship between educational attainment and economic growth in both cases, the 2008 study

of Brazil prepared by Rodriguez *et al* clearly indicates that innovation and productivity growth have been heavily constrained by the low proportion of adults with tertiary-level qualifications and the lack of linkages between universities and the productive sectors.

Figure 2 – Evolution of the Educational Attainment of the Labour Force in South Korea and Brazil (1960 – 2010)



Source: Barro and Lee (2012). *Educational Attainment Dataset*. Available online at www.barrolee.com

Another interesting piece of information is to analyze what happens with the scientists who are trained in both countries. In Brazil, 72% of PhD graduates stay in academia. By contrast, in Korea, 60% of them go out and work in the R&D departments of private firms, contributing to innovation and productivity growth. It is therefore no surprise to see that South Korea is doing much better in terms of patent production. In 1985, both countries were about at the same level, producing every year 50 new patents in South Korea and 39 in Brazil. By 2011, South Korea produced 14,440 patents a year, compared to 336 in Brazil. And let us not forget that Brazil is four times as populated as South Korea.

Brazil does boast a few success stories, though, such as Embraer. How has Embraer become the world leader in the production of regional planes? Is it just good luck, a pure random happening or the product of a deliberate strategy? In the late 1950s, the government had the vision of establishing a world-class airline industry. For that purpose, it set up, in partnership with MIT, the Technological Institute of Aeronautics. That is how Brazil was able to train the scientists, technicians, and engineers who built this world-class industry.

Let me give you another example to illustrate the importance of knowledge from a place closer to Kazakhstan. In northern 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 1970s, the CEO of that company started to get worried about the future of his industry and so he challenged the Government – ‘If you establish a polytechnic university in Oulu, I commit to investing in modern labs and to bring more private sector investors.’ Academics 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 the City of Oulu and the University of Oulu share a single website – because their development has been so closely interlinked. What was the name of this company whose CEO had a futuristic vision? It was Nokia which moved from being a company producing paper and cardboard and cables to becoming a world leader in electronics, contributing 20% of Finland’s exports and two-thirds of the country’s R&D funding.

Some people may object to this example because we all know that Nokia is not doing so well these days. But in fact it offers a second relevant lesson. Being a leader today does not guarantee in any way that you will continue to be a world leader tomorrow unless you keep renewing yourself and unless you keep innovating. What is true for a company is also true for a university.

Comparing two countries that are leaders in innovation, Chile in Latin America and Finland in Northern Europe, we can see that Chile has a population of about 17 million people, but only 185 PhD graduates working in companies. By contrast, Finland with only 5 million people has 23,000 PhD graduates working in industry.

The last point about knowledge is the acceleration of speed of creation of new knowledge, which makes it challenging for universities to operate as in the past, because in many disciplines what the students may learn in first year, may have become obsolete by the time she or he graduates.

The Impact of Innovation on Tertiary Education

Let us look at the side of the coin. How can innovation help universities improve skills acquisition? I see three dimensions that are very relevant. First, how do you produce the new global competence skills, attitudes and behaviors that are needed? Second, what type of new pedagogical practices can you introduce? Third, how can you rely on new technologies to support innovative teaching?

Many of you may have read a 1983 book called *Innovative Minds*, where Harvard professor Gardner first developed the idea of multiple intelligences. His work led him to the conclusion that that we should not see only the intellectual intelligence part (linguistic and logical abilities) but also the artistic part of human intelligence and the emotional part that are all very important constituents of the skills, knowledge and attitudes that graduates need. Australia’s chief scientist recently spoke about the importance of science for the future. “Without science we would have too little food to provide for the world and too little water for agriculture. Without portable water our health will suffer; without science our lifestyle will be damaged beyond repair; our future will be bleak to save the very list.”

So, the implication might be that we should focus on the STEM disciplines and forget about the humanities if it is all about science and if that is where our future lies. But I think this is a mistaken view, because we have to make fundamental distinctions between STEM skills and STEM degrees. When we think about a possible mismatch between higher education and the world of industry, this is a very important distinction to bear in mind. STEM graduates do not only go to STEM jobs, and vice versa. Policy makers in some US states now define what they call a pathway approach, which looks at what actually happens to university graduates. Recent findings show that many of the STEM graduates will go to non-STEM jobs. Similarly, while many of the humanities graduates will of course go to humanities and social science functions, a growing number of them are going to STEM professions.

People are now talking about STEAM skills, adding the arts dimension to the range of competencies that are needed for innovative economies. It does not mean that there is a need for

preparing more arts graduates. Rather, it is increasingly about forming people who can integrate both sides of the equation, the technology part and the design part. A friend of mine, professor at the University of Hong Kong, recently interviewed the CEO of Samsung cellular phones and asked him: "What kind of graduates are you looking for?" and "What kind of engineers or technicians do you prefer?" To my friend's surprise, the CEO of Samsung cellular phones responded that his challenge was not so much about finding graduates with good engineering or technical skills but the ability to also incorporate those skills that will allow them to design exciting new products. In fact, increasingly, the difference between high-tech products is not so much linked to their technical specifications but also to the design and the appearance. Steve Jobs once said that "it is not about the technological specifications of the products, but all about the marriage between technology and the humanities. That is what allows us to create the kinds of products that make our hearts sing."

Today the mission of universities is to impart complex competencies. These are the global competencies of the 21st century, notably information analysis, critical thinking and problem-solving, and global contextual analysis. Today, Nazarbayev University is not training people only for Astana, or for Kazakhstan, or for Central Asia. It is for the entire planet. And how do we prepare people for creativity? It is about learning to invent, to experiment, to think out of the box, to take chances, to break the rules, to make mistakes as part of your learning process, and to have fun throughout the entire learning process. While this is what Nazarbayev University is trying to do with its new curriculum, there are still many universities in the world that are teaching in a traditional way, leaving no room for innovative thinking and creativity.

The 21st century competencies are also about teamwork, collaboration and communication. Are we doing a great job? I like to talk to employers when I visit a new country, and I ask them the same questions as my friend from the University of Hong Kong asks. "What do you think about the graduates of the local universities? How are your new recruits doing?" Invariably I get the same answer: "Yes! The engineers, the doctors, the lawyers that come out of these universities are well-trained professionals. But ... they do not know how to work." Curiosity, motivation, initiative and entrepreneurial thinking are equally important characteristics among the competencies that graduates need. Finally come leadership skills and ethical awareness, which is the extent to which graduates are aware of social, cultural and environmental issues.

Is the Kazakh system of education doing a good job preparing for the 21st Century skills? If we believe the results of the latest PISA tests, which measure the proportion of 15-year-olds who are able to master problem resolution challenges, Kazakhstan, Kyrgyzstan and Russia are not doing too well, appearing all below the OECD average. This makes the task of universities more difficult, when the incoming students have not been fully prepared in primary and secondary education. For this purpose, Nazarbayev University has put in place a Foundation Year to complement the academic preparation of all new students.

The other important dimension that we need to be aware of is the need to think in terms of lifelong learning, which has to be embedded in the regular education of our students. Which of us would freely consult a medical doctor who announces that s/he graduated 30 years ago and has not learned anything since then? Preparing the students for lifelong learning does not mean only training them in self-learning skills, but also getting them to learn to unlearn, in order to get rid of those skills and competences that are not useful any more, and learning to re-learn to update their knowledge. The founder of Polaroid, Edwin Land, once said that it is not that we need new ideas, we need to stop having old ideas. Alvin Toffler, the famous futurologist, said that the illiterate person of the 21st century will not be the person who cannot read and write, but rather the person who cannot unlearn and relearn.

The possibility of applying new pedagogical approaches is an important dimension of innovation. Today, the educational process cannot be defined anymore in terms of what and how the teacher

likes to teach. It is imperative to focus on the needs and motivations of the individual learner. For that purpose, it is possible to organize the learning process in an interactive, collaborative and experiential mode. So, for example, one should not wait until the fifth year of engineering education to give the students the opportunity of making things, or the fifth year of medical education to start meeting with the patients. This paradigm shift requires that professors humbly accept that they are not indispensable for transmitting knowledge and recognize that their students can learn a lot on their own, and can learn from their peers. At MIT, for instance, several professors have experimented with the so-called flipped classroom, where the professor does not teach anymore and the students learn on their own. When they come to a session, the professor puts them to work in teams to solve problems as a way of verifying whether they have fully understood what they learned on their own and are able to apply the knowledge in a concrete manner.

Conclusion

In conclusion, universities have the opportunity to embrace a totally new education model. Before, it was all about the transfer of knowledge. Today students and professors are working together to construct knowledge. Before, it was all about following the instructions given by the teacher. Now the students can follow their passion. Before, students learned essentially in the classroom. Now they learn 24 hours a day, 7 days a week. Before, they learned on their own. Now they learn in teams.

This transformation is likely to affect the shape of universities, moving away from the traditional pyramidal structure with a majority of undergraduate students and a small proportion of graduate students towards a star configuration where undergraduate and graduate studies will be only one part of what universities do. More importantly will be the continuing professional development and career change studies needed to help people adjust to constantly changing job requirements. In addition, universities are not meant to only train professionals but also good citizens; for that reason, imparting citizenship and life skill will also be an important component of the curriculum.

Finally, it is worth noting that, because of the rapid changes characterizing the environment in which they operate, universities cannot afford to stay still. They need to keep improving constantly, driven by the awareness that universities elsewhere are not going to wait for them to get their act together. And the best way to prepare for a world of intense competition is through increased cooperation and collaboration. In that respect, we should recognize the wisdom of Nazarbayev University, which has focused from its first days on a strategy that embraces active collaboration with multiple partners in Europe and North America. As it pursues this strategy, it should continue to elaborate its own vision and work towards its implementation, always remembering the sage words of the Roman philosopher Seneca, who wrote more than 2,000 years ago that “there is no favorable wind for those who don’t know where they are going.”

References

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