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Future-ready Universities and Graduates: Quality Education Beyond the Horizon

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Working Group #1: Interdisciplinary and Holistic Education and Research

Interdisciplinary and Holistic Education and Research

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Introduction

Education and research forms part of a social contract between government, society, and business. Each of these players confront the challenge of defining their role in an increasingly sophisticated and inter-linked society, with social networks upending a good deal of conventional thinking.

The main task of education and research is to plug into tomorrow's needs and train people to perform in an economic and technological environment which we do not know very much about today. They must possess competences and abilities to tackle unknown problems using unknown instruments. The role of the other partners in the social contract is to deliver an input making it possible for education and research to form a rough picture of tomorrow.

Interdisciplinary and holistic education and research is indispensable because tomorrow key players will ask for the ability to combine cognitive skills with teamwork and debate focus on adaptability and adjustment, and replace the silo thinking with a more flexible approach to applying knowledge from different sectors are relevant or not.

The industrial age was characterised by materialism, pointing towards some kind of permanence as materialistic things pushed our epistemological approach in that direction. The shift to an audio-visual world or network world means the downgrading of materialism.

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[1] *Some of the ideas in this essay have been set out in more detail in my books 'HOW ASIA CAN SHAPE THE WORLD, from the era of plenty to the era of scarcities', Singapore 2010 and 'THE VEIL OF CIRCUMSTANCE, Technology, Values, Dehumanization, and the Future of Economics and Politics', Singapore 2016.*

What do we know about tomorrow's jobs?

Embarrassingly little. World Economic Forum [Future of Jobs, 2016] offers two crucial observations:

'In many industries and countries, the most in- demand occupations or specialties did not exist 10 or even five years ago, and the pace of change is set to accelerate. By one popular estimate, 65% of children entering primary school today will ultimately end up working in completely new job types that don't yet exist.'

'On average, by 2020, more than a third of the desired core skill sets of most occupations will be comprised of skills that are not yet considered crucial to the job today, according to our respondents. Overall, social skills—such as persuasion, emotional intelligence and teaching others—will be in higher demand across industries than narrow technical skills, such as programming or equipment operation and control. In essence, technical skills will need to be supplemented with strong social and collaboration skills.'

From this we can deduct two fundamental points. The first one is that already, education and research are out of tune with demand for skills. The second one is that the tendency to focus on cognitive skills (STEM-Science, Technology, Engineering, and Mathematics) may not be wrong per se, but what increasingly matters for reaping the productivity benefit of such knowledge is soft skills – how to use our knowledge and take opportunities offered by technology. This is where education and research are out of tune.

Over past decades most countries have fallen into the trap of overextending cost-benefit analyses. Ministries of Finance have got too much power enforcing short term fiscal planning on education and research – as in most other sectors – disregarding what lies outside the narrow fiscal angle. It seems that most countries have forgotten the saying attributed to Albert Einstein: 'Not everything that counts can be counted, and not everything that can be counted counts.' It is easy to count STEM competences, not easy to measure social skills.

Lesson #1:
Focus on the ability to use knowledge and how to adapt.

Lesson #2:
Question cost benefit analyses looking for fiscal results here and now.

Lesson #3:
Long term thinking is required.

The three main job sectors

Much attention is devoted to high calibre education and research and for good reason but looking at future demand trends, the human factor may actually be more important than normally assumed. The health sector, permanent improving of skills, and entertainment may well prove to be the growth sectors of the future – and the main job providers – forcing education and research to integrate those skills in their programmes.

Human maintenance will grow almost exponentially steered by demographics with elderly people creating demand and technology providing the supply side in the sense that we are able to do more and do it better to keep human beings going. Doing the sums for China, India, and Indonesia and, in a couple of decades, for Africa makes you dizzy.

Human improvement perceived as ability to plug into new technology falls in the same category. It is sometimes overlooked that the higher productivity embedded in new technology only blossoms if humans have the skill to manage technology.

Human entertainment follows from a shorter working time and longer life after retirement. Elderly people will not accept, as earlier generations did, to sit and wait. They are active (thanks to human maintenance, and demand to be entertained). In this sector falls social networks and communication. However, they need help to be coached, so to speak, presenting huge job openings.

Lesson #4:
Future is about meeting human needs – less about materialistic demands.

Lesson #5:
Feeding-back to education and research is how to interact with other human beings, which means going against the current trend of dehumanisation.

The three main motivating forces

A flywheel for teaching students how to adapt and adjust is motivation and self-confidence. The more students believe in their abilities to tackle problems irrespective of whether they are inside or outside their discipline, the easier it becomes for them to do so. There are three key concepts: autonomy, mastery, and purpose.

Autonomy means that students learn how to learn, how to perform, and how to do research on their own without seeking instructions or guidance. In the industrial world guidance was normal as those societies were not evolving very fast, so the —we used to do it this way' approach was not completely wrong. Today, it couldn't be more wrong. Only if students learn to work on their own can they survive to be confronted with new and unknown problems for which there are no paradigms.

Mastery is a feeling that you are in control of your subject, craft or trade depending on your profession. To renew yourself and your abilities, the starting point must be possession of full knowledge about how things are under current conditions, existing technology, and 'conventional wisdom'. This is, by the way, also necessary to gain respect from others and their acquiescence when canvassing for new paradigms.

Purpose is a clear understanding of what 'we' are doing, why and how. Every enterprise or organization should have, and must have, a purpose communicated to staff. This is where feed-in and feed-out become relevant. Feed-in puts the burden on the staff, expecting them to show initiative and inform the upper layers of

how they see things, how things can be improved, and how things can be done differently – in fact constantly challenging whether —this is done in the best way'. Feed-out means that the upper layers are capable of informing the staff about objectives, goals, and instruments for how to achieve these, combined with an open mind from the staff.

Autonomy, mastery, and purpose are rarely taught in education and rarely form a core in research, and yet it is indispensable as a platform to cope with change. It requires a good deal

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of trust between leaders and staff, plus, not least among people working on the same level. The key is sharing of knowledge. Only by doing so can technology, research and innovation fulfil potential and sharing only takes place if individuals feel they operate in a reciprocal system where they share and others share with them.

Lesson #6:
Combination of individualism, creativity and teamwork is the plinth for further development of societies.

Lesson #7:
The task will not be the same for Asia and Europe as cultural background tells that Europeans and Asians behave and act differently facing these challenges.

Lesson #8:
What should be done, is not to seek a common denominator, but to explore what each cultural background tells us is the comparative advantage and start from there.

How will the university of the future looks?

There is a lot of talk about the impact of artificial intelligence, quantum computing, and the internet of everything. In this context, it suffices to say that they are the messengers turning education and research upside down.

Compared to the industrial age we move from:

- Narrow disciplines and specific approaches delivering reproducible scientific results (i.e. one solution) to options from which to choose and the possibility of comparing different options (i.e. changing the input data to see how it affects the output).
- Looking at the result to focusing on asking the right questions.
- Working inside a well-defined scientific discipline looking for sector specific results to searching for solutions across disciplines (combining disciplines).

The key point in this is a shift from more than two hundred years of deduction to induction as the plinth for education and research using interdisciplinary and holistic thinking.

Formerly the chosen method was to form a theory and, from there, work to solve a problem and seek an answer. Theory comes first, problem solving afterwards. This was deduction. In the computer age, it led to computer models looking for an answer – one answer. It worked well because we operated with simple systems.

Big data, quantum computing, and artificial intelligence deliver complex systems that may require us to see correlations - interactions and interrelationships - without needing a theory. On this basis, there needs to be an assessment to find out what we need in the particular context. To do that, the system must be malleable and open for adaptation, as more than one solution is possible. The end goal should be systems or the use of current language models that adapt themselves. This is induction.

Education and research have reached the point of reckoning with the whole edifice of thinking behind the industrial-age, mechanistic thinking based on how to manufacture, use energy, and depend on materialistic consumption. It will take some time for this to sink in.

It is the logical consequence of the complementarity principle for quantum mechanics as formulated by Niels Bohr (Copenhagen interpretation), that rejects the axiom of classical physics saying that mutual exclusivity is necessary to deal with atomic entities. The complementarity principle, on the contrary, stipulates that depending on experimental situations objectives may exhibit several characteristics. A priori, we do not know which one of these characteristics will be observed or measured. Objects have complementary properties which cannot all be observed or measured simultaneously. In my interpretation, the fact that the holy grail of physics – quantum mechanics – prognosticates the shift in scientific philosophy consolidates the belief that

this is the way ahead.

Bala [2017] analyses Bohr's thinking and draws two conclusions of crucial importance for interdisciplinary and holistic education and research.

The first one is that the complementarity principle according to Bohr applies beyond physics, and is relevant for social sciences, even if Bohr gives more attention to disciplines like biology and anthropology. In layman's terms, Bohr, using Bala's interpretation, opens the door for complementary as a general principle. This is contested and will surely continue to be so, but when seminal shifts take place we all have to be open to new and different thinking.

The second one, highly relevant for Asia-Europe, is Bohr's thesis that thinkers like Buddha and Lao Tse did wrestle with these epistemological problems. What Bohr is saying is that ancient Asian philosophers realized complementarity and its possible application over a wide range of science much before European science did so.

The difference is that Europeans like Bohr approached this line of reasoning from a purely scientific point of view – quantum mechanics – while the Asian thinkers did so from a philosophical worldview[2]. A daring thought is that herein lies the possibility of sowing the seeds for combining science and philosophy. Add to this a larger degree of congruity between Asian and European thinking than hitherto believed, and a new horizon beckons. Bala in his previous book [Bala 2006] shows that there is historical linkage and communication between Asia and Europe in science; a phenomenon largely forgotten, but of obvious significance at the present junction.

European universities confront this massive change with basically two models. The 'Anglo-American' one is the analytic pattern of moving from the parts to the whole - the whole is just the sum of the parts. The 'Continental' one reflects a pattern of moving from the whole to the parts and then from parts to the whole in a cyclical process to understand a system. This is the hermeneutic method of understanding a text. In this context, the German model – the Humboldtian model of higher education – seems most promising as it explicitly calls for a holistic approach bringing in general learning and a cultural approach. Embedded in this is a high degree of freedom for students to choose their study which has been undermined by quota systems mainly because of fiscal restraint. Interestingly, Humboldt also wanted students to become world citizens.

Apart from the top layer of universities in Asia many are still new and, in some cases, almost embryonic. This gives Asia a chance to start from scratch forging its own university model. It is by no means certain that, despite the race to get on the ranking list, Asia will be best served by universities in the mould of Europe and the U.S. Maybe a higher attention of the virtues in ancient Asian religions and philosophies may be a better way.

Lesson #9:
The decisive element is to understand complementarity and extend it to social sciences.

Lesson #10:
Bohr's view on complementarity is closer to the hermeneutic orientation than the analytic one, which opens not only for new thinking about education and research, but also for convergence between Asian and European attitude towards the future of these two pillars of society.

Lesson #11:
This line of thinking points towards seeing science and philosophy closer to each other with far reaching consequences.

Conclusion

Interdisciplinary, holistic education and research heralds a new age calling for a new paradigm. It forms part of the seminal swing from industrialism anchored in materialistic thinking to communication and networks downgrading materialistic consumption while upgrading interaction among human beings. Technology opens many windows, but human skills determine how they are used. Instead of digging deeper to understand a narrow discipline or problem better, it becomes possible to get a deeper grasp of how

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things we meet in our daily life interact with each other to shape what may be termed the 'reality'.

The first step is to realise that what worked well until a few decades ago with education and research as a sector of society, but not linked directly to the rest of society, does not work anymore. There is a need for a new social contract with education and research (universities) playing a much more direct role in forging societies, and with government, business, and societies interacting much more with universities. What I call feed-in and feed-out between segments and sectors of societies should be enhanced.

So far interdisciplinary and holistic thinking has been welcomed by many universities, but mainly incorporated in the way that special courses have been set up or some kind of appendix to existing curriculum introduced. This is better than nothing, but unfortunately it reflects an industrial age response. It is the whole way of teaching, learning, researching, and innovating that calls for change. In short, barriers between disciplines must be torn down. It is still so that students graduating give very little thought to how their skills can be applied outside the discipline they graduated in. Big data and shifting from deduction to induction may help moving into a world of permanent adjustment and adaptability. A key guidance could be that it doesn't matter how the problem is solved as long as it is solved.

A strong emphasis has been given to STEM. That is understandable seen in the prism of industrialism, but in the future, we may benefit by shifting priorities more to soft skills telling us how to combine various elements and ask the relevant questions seeking options. STEM mind-set is geared to fact and cognitive skills, making it difficult to apply interdisciplinary and holistic thinking.

Concluding lessons:

- Interdisciplinary and holistic thinking can only work through human ability to combine observations and put them together in various contexts depending on circumstance and the problem to solve.
- It may be worth the effort to give thoughts to how Bohr's thinking about complementarity can be introduced as an overall principle in education and research. It may form the epistemological basis for interdisciplinary and holistic thinking.

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[2] According to Joseph Needham [1991] Chinese science envisioned the universe in terms of correlations – what he termed 'correlative cosmology'. Stanford Encyclopedia of Philosophy offers the following observation: —It is striking that the model that dominated modern European thinking about causality—linear causality through collision (on the model of billiard balls) was not central to Chinese reflections on causality (as it also was not central in Europe before the late Renaissance). For Chinese philosophers, the paradigms for causality were things like the effects of music over a distance, the relationship between spring and the growth of plants, and the influence between a teacher and a student. This orientation followed from belief that all things are interconnected and are ultimately composed of the same stuff—qi. It also reflected practical concerns — How does culture work so that people can live together harmoniously? How do we relate to nature in a way that is sustainable?

The 6th edition of the ASEF Rectors' Conference and Students' Forum (ARC6) will address the topic of "Future Universities and Graduate: Quality Education Beyond the Horizon" and invites over 280 representatives from academia, governments, business and industry, students and youth associations as well as NGOs and IGOs.

The ARC6 consists of 2 programme elements: 1) a Students' Forum 2) followed by a Rectors' Conference. Close linkages between the Rectors' and the Students' is assured through a synergic exchange in which 4 Rectors' attend the Students' Forum as Mentors and 4 Students' participate throughout the Rectors' Conference.

Specifically, ARC6 aims to:

- Contribute to the policy dialogue on higher education in Asia and Europe and provide input to the agenda of ASEM Education Ministers
- Support the implementation of the SDGs
  Facilitate cooperation and long-term partnerships among universities across Asia and Europe
- Enable collaborations among student networks and associations
- Strengthen the linkages between universities, governments, business and industry, IOs and NGOs, and local communities

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