

Mapping the Future Higher Education

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1 The Most Impending Issue

Sustainability

Higher educational system stands at the last stage of current traditional educational system starting from kindergarten. This current educational system needs to be supported by the healthy and sustainable society. In return, it is supposed to take responsibility for the sustainability of society on which it stands. Hence, educational system has been presumed to contribute to find solutions for impending issues our society faces.

What is, then, the most impending current issue we face now? We believe it is the sustainability of our society and the survival of human beings. To see why these are imminent issues, the reader is referred to the publications such as T. Colborn, etc.(1997), L. Brown (2001, 2003), and Meadows, etc. (2004).

Since the Industrial Revolution throughout recent information age, expanding economic growth, accompanied by capital accumulation and population growth, has been considered a beneficial indication for the welfare of society. Accordingly, many socio-economic systems have been structured to this end. Specifically, educational system has been arranged to this end for promoting further scientific discoveries and their technological applications.

Only recently we begin to realize that this endless economic growth is physically impossible in our spaceship Earth due to the limited availability of nonrenewable resources and natural capacity of sink to regenerate wastes dumped by economic activities. Against this new reality we desperately feel defenseless because our current socio-economic systems are not built to cope with it.

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To understand this new reality, I have constructed system dynamics simulation model step by step for probing long-term sustainability. What will happen, I posed, if our economy continues to grow under a limited availability of non-renewable resources? A simulation result from our ecological reproducibility modeling is obtained as follows:

“this growth path is eventually curbed by a decrease in net output, and declining population follows as illustrated in Figure 3.10. (Yamaguchi, 2004, p. 54).”

Figure 3.10 is reproduced below as Figure 1, in which sink stands for the accumulated stock of wastes dumped by economic activities of consumers and producers, while source represents a renewable resource stock made available from the sink through recycling and natural regeneration. Data used in the model do not reflect real figures. In the figure non-renewable

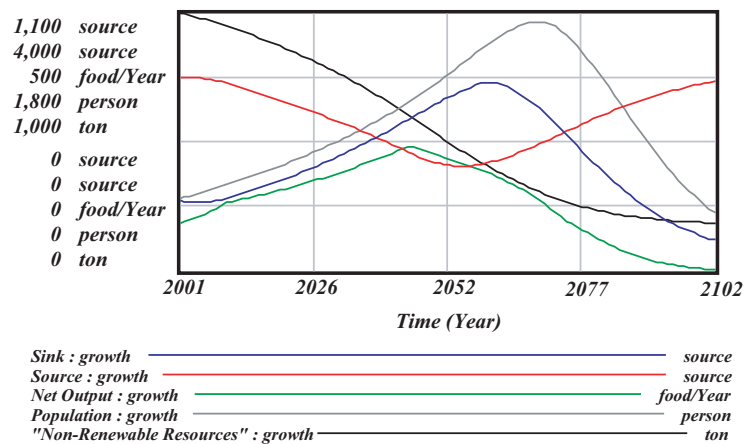


Figure 1: Unsustainable Growth Paths

resources continue to decline and population as well as net outputs will be destined to collapse toward the latter part of this century.

Root Cause of the Issue

Why do we recently begin to face sustainability issue in an unexpected fashion? It is partly because there have been very few who have observed the behaviors of our spacecraft as a wholistic system and warned in advance

its unavoidable dangers underlying current trends of economic growth, and partly because we are so deeply preoccupied with myopic material happiness that such warnings are insensitively or intentionally overlooked. In short, fewer observers of the whole system and human greediness are deeply related to the recent rise in sustainability issue.

Let us here focus on the former, since the latter has been an old problem since the days of Buddha. Existence of fewer observers of the whole system is related with the traditional educational system, under which study of the whole has been fragmented into very narrow and limited studies of its parts. Underlying philosophy of this fragmentation is that the whole consists of its parts and the solutions arising from parts will eventually attain a solutions of the whole as well, as if cutting an ill-affected part of our body will restore our entire physical health. Accordingly, observers of the whole failed to find places suitable for their activities in the traditional education system.

This line of thought comes from philosophy of reductionism such that complex life-science phenomena can be explained by the laws of physics and chemistry. Discoveries and best solutions for the parts hence lead to a complete understanding and a harmony of the whole. Accordingly no one need to worry about the behavior of the whole.

Similar philosophy is currently dominant under the globalization of market economy. According to neoclassical (mainstream) economic theory, market equilibrium in which demand is equal to supply is attained through price flexibility and free market activities. Thus, no policy of government needs to be introduced to reorient irregularities and disequilibria of market economy toward full employment macroeconomic regularities. In other words, observations of the whole macroeconomy by national government, and the world economy by world government such as the United Nations are in principle not required under current world globalization of free market economic system.

Led by these ideas of reductionism, inquiry of knowledge at the higher education has been fragmented into narrow fields of studies on parts. In its due course, however, solutions for a part continued to produce new problems in other parts; that is, one solution becomes another cause of new problems. To tackle this vicious cycle, a newly fragmented part has been added one by one to the traditional education system. In this way current universities as a whole have more than hundred fragmented departments or faculties specializing in the analysis of parts without communicating one another. This struggle for further fragmentation seems to be endless. Figure 2 illustrates one-way move of fragmentation from the whole to its parts in the traditional educational system.

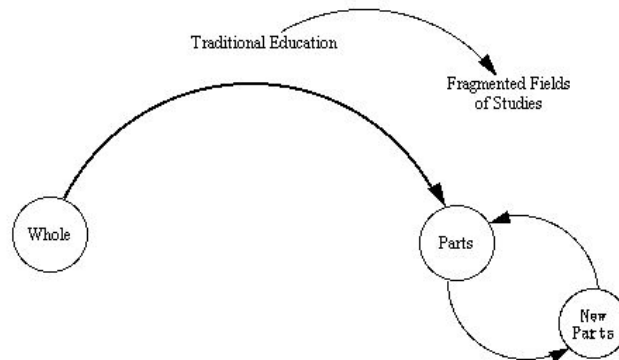


Figure 2: Fragmented Fields of Traditional Education

On the contrary, no department or faculty has been created that tries to study the behavior of the whole, except some recent synthetic ones which tries to incorporate interdisciplinary studies. There is a logical inconsistency, however, to create the study of the whole in the current educational system, because once it becomes a part of the fragmented studies, it inevitably stops to be the study of whole that includes itself. In this way study of the whole failed to find a place to fit into the traditional educational system.

On the other hand, sustainability issue needs a wholistic solution. And by its nature, finding such a sustainable solution has been left out of the traditional educational system. This is an irony of the current educational system which is supposed to find sustainable solutions for the society on which it stands. In this sense it has become a self-destructive system and can no longer be a vanguard of the sustainability of society. That is to say, current higher educational system has become a root cause of the sustainability issue we face. How can we break down this root cause?

2 A Sustainable Path

In the above long-term sustainability model, I have shown, by running a Monte Carlo simulation, how difficult it is to find a sustainable path randomly over the 22nd century. If we could find it, I would say, we are very lucky!

“One such ecologically sustainable growth path over the next two centuries could be, with luck, attained at the output-substitutes

ratio of 20 per cent and 80 per cent level of substitutes for non-renewable resources as illustrated in Figure 3.13. Even so, it would be burdensome to attain such constant values in reality. How can we produce 80 per cent level of substitutes for non-renewable resources such as oil and other fossil fuels? How can we lower the output-substitutes ratio by producing substitutes more efficiently so that the amount of output is not excessively eaten up in the production of substitutes? (Yamaguchi, 2004, pp. 56-58).”

Figure 3.13 is reproduced below as Figure 3, in which one lucky sustainable path is shown to be attained under strict conditions quoted above.

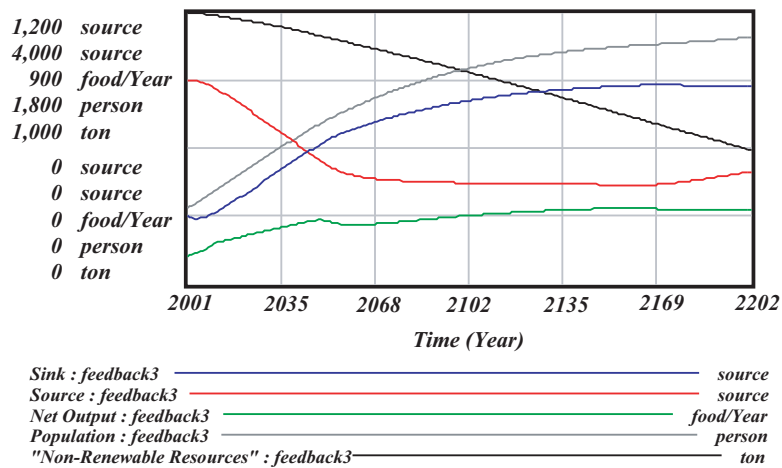


Figure 3: Lucky Growth Paths with Ecological Feedback

From the Parts to the Whole

To attain a sustainable path, all appropriate existing knowledge of science and technology have to be brought together for meeting the conditions quoted above. However, from the above argument, the root cause of the sustainable issue is the fragmented traditional education system based on the idea of reductionism. Therefore, to attain a sustainable path, root cause of the traditional education has to be brought to an extinction. This does not imply that the current educational system is to be eliminated. Instead, it means that we have to establish additional educational system, outside

current educational system, that brings the fragmented parts into the whole once again.

This is a new establishment of future higher education we recommend. We need to build it most imminently for the sustainability of society and survival of ourselves. The role of future higher educational system is to reverse a traditional movement of fragmented studies on the parts to the study of the whole. Figure 4 illustrates a complementary path that reverses the movement of the fragmented parts by traditional education into the whole by future education.

We strongly believe that this reverse movement can be done by two fields: future-oriented studies and system dynamics. These two fields in the newly created future higher educational system will enable the study of the whole, and cope with the sustainability issue. This is what we like to pose here.

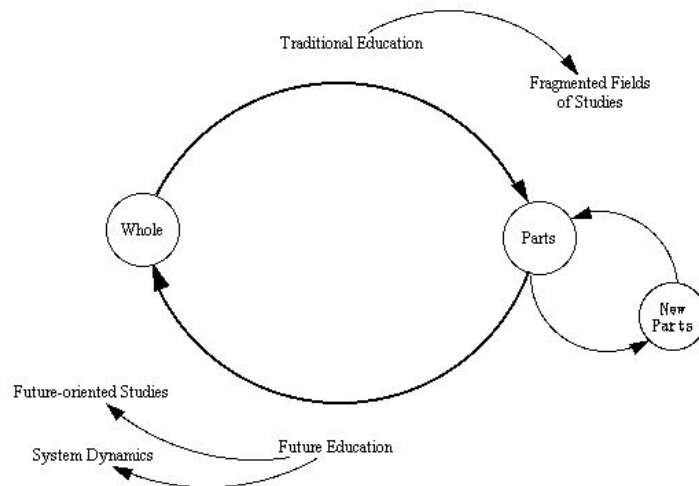


Figure 4: From the Education of Parts to the Education of the Whole

3 Future-oriented Studies

Let us now discuss these two fields one by one. My introduction to the futures studies (here called future-oriented studies) took place by chance here in Hawaii in 1987 while I was teaching at the Univ. of Hawaii, Manoa. One of my students in economics class one day introduced me to Prof. Jim Dator, a well known futurist scholar, whose office turned out to be located

above my office in the same building, saying that what I'm teaching in the class is very futuristic!

Since then I have been actively involved in the activities of futures studies. One of my major activities was the organization of futures seminars in Awaji Island, Japan, with an objective to establish a future-oriented higher institution dubbed Network University of the Green World (<http://www.muratopia.org/NUGW>) . The seminars were held for seven years from 1993 through 1999, then suspended due to the lack of fund.

In the book based on the first seminar in 1993, I have indicated that "what has been missing in industrial-age scientific research, and hence in the academic curricula of present-day higher institutions, is a study of interrelated wholeness and interdependence" (p. 200, Yamaguchi, 1997). The study was there defined as future-oriented studies.

At the invitation to this conference, I have revisited the book with a conviction that my remark on the future of higher education is still worth to be upheld. For instance, faced with the threat of our survival due to global warming and environmental disasters as pointed out above, future-oriented studies of interrelated wholeness and interdependence seem to be urgently needed for solving such complex problems, since solutions offered by professionals at the current institutions might be the causes of another problems as Asian wisdom connotes.

For our survival and sustainability, we need future-oriented higher education which provides wholistic visions and solutions to the present complex problems created by fragmented science and technology of the present-day higher education.

FOCAS

Future-oriented studies we developed in Awaji Island seminar are more specifically called Future-Oriented Complexity and Adaptive Studies (FOCAS). It aims to

- understand the interrelated wholeness and interdependence of future-oriented complex phenomena (such as natural, environmental, and socio-economic phenomena) which cannot be *linearly* predicted, and
- use our brain and technology such that human beings (individuals, communities, and societies) will be able to get well adapted to them.

For the attainment of this objective, the following five fields of studies are encouraged to be brought to the attention for any specific field of study as an inseparable interrelated whole (Yamaguchi, 2002).

1. Wisdom and Self-Awareness Studies (Mind)
2. Future-Oriented Methodological Studies (Model)
3. Human–Nature Interrelated Studies (Nature)
4. Human–Technology Interface Studies (Technology)
5. Inter–Human Networking Studies (Economy)

Figure 5 illustrates how these five fields of studies are interdependently evolving into the future. It tells us the importance of rethinking interrelated feedback relations, whenever a new decision, strategy, policy and/or technology are introduced into our system of the whole, in order to avoid a further production of new problems.

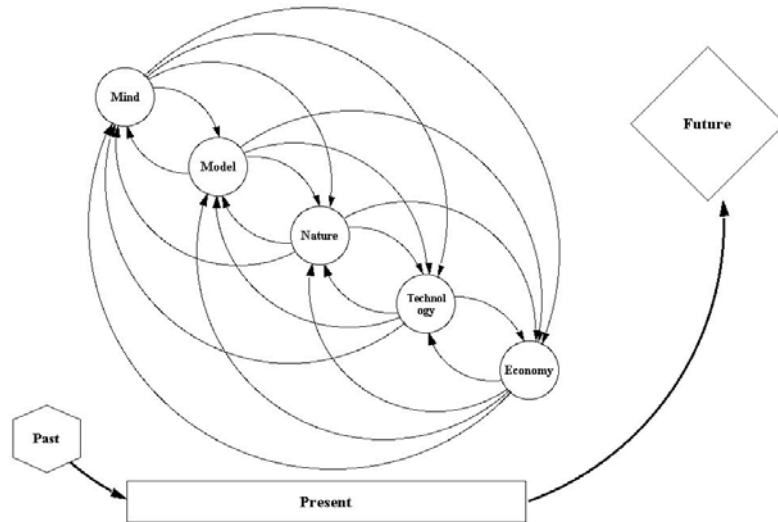


Figure 5: FOCAS vision of Future Higher Education

4 System Dynamics

Throughout the future-oriented activities, I was also led to the systems view and system dynamics. It is a relatively new field of study which was originally developed by Prof. Jay Forrester at MIT in 1950s. System dynamics

uses a computer simulation method to analyze dynamic behaviors of system structures in physics, chemistry, engineering, environmental studies, business and economics, and public policies, to name a few. According to the Web site of the System Dynamics Society (<http://www.systemdynamics.org>), the span of system dynamics application now encompasses the following fields of work:

- corporate planning and policy design
- public management and policy
- energy and the environment
- theory development in the natural and social sciences
- dynamic decision making
- complex nonlinear dynamics

Surely the above-mentioned long-term sustainability model and World3 model in the Limits to Growth (Meadows, etc. 2004) are constructed by system dynamics modeling method. In short, it covers many dynamics fields of studies, and in this sense it shares a similar interdisciplinary vision with future-oriented studies.

Due to this interdisciplinary nature, system dynamics also faces a similar difficulty of finding its legitimate position as an academic discipline in the highly segmented current higher educational system, as future-oriented studies do so.

To be promising, however, system dynamics is now being gradually introduced to the K-12 education as a creative learning method (<http://clexchange.org>). In this sense, it could provide a foundation of future's education system throughout a whole spectrum of education, starting from kindergarten all the way to higher education.

Hence, future-oriented studies and system dynamics will constitute two major fields of future's higher education, using our brain on the one hand and computer on the other hand for a study of interrelated wholeness and interdependence in order to attain human and environmental sustainability.

5 Future of Learning Styles

Networked Learning

Intensive use of Web and IT technologies is changing the way we learn favorably toward the future's higher education of future-oriented studies and system dynamics. Since they are by nature interdisciplinary and multi-faceted, no one current institution can offer these two fields completely, and students are obliged to search for an appropriate site on the net for their learning contents. Network technologies enable them to learn through time and space at their own discretionary level and pace.

In this sense, students need to enroll their own community-based institutions rather than attending remote universities, and accordingly to be inspired to develop a strong sense of belongings to their community, contrary to the current trend of globalization.

Yet, for effective learning, they need a good teacher as their knowledge navigator toward the future-oriented studies and system dynamics. A small number of such navigators are sparsely distributed among the current higher educational institutions. How we can create such future's navigators more widely will be the issue we have to challenge for the future of higher education.

Continued Learning

To catch up with a rapid change in technology and workplace environment, many people are coming back to higher institutions for further vocational training and learning. This trend also offers favorable environment for the future's higher education, because problems people are facing at their workplace are getting more complex and may need a wholistic approach toward a better solution, and such an integrated solution requires continued cultivation of wholistic knowledge throughout their entire career.

Front runners in this trend are business schools now widely established world wide. Luckily, business schools stand outside current educational system, and are in a good position to adopt future higher education discussed above. Besides, they are very influential for creating futures, because futures are created by the current decisions and most of decision are made by business people.

Therefore, sustainable future depends upon the decisions made by business people. According to Lester Brown (2003), there are two types of managers. Plan A managers are those who run business as usual, while plan B managers are those who pursue sustainable business.

For sustainable futures, let us focus on the roles of plan B managers (who are hereafter called green managers). Green managers of corporations and institutions require a wholistic view of how their organizations behave as a result of interrelated behaviors of their constituent parts. Then they need to write sustainable business scenarios for future strategies, which in turn requires a deeper consideration on how decisions based on their scenarios trigger interrelated feedback reactions. FOCAS way of thinking will become indeed very helpful for writing sustainable business scenarios for better future.

Moreover, system dynamics modeling method will also be very helpful for green managers to clarify visions and strategies and share them with employees and stakeholders. In this way the use of computer simulations by system dynamics modeling becomes another essential field for sustainable management.

It will be now clear that fragmented knowledge will be no longer effective for the sustainable corporate management. For better education of green managers, business schools, which luckily stand outside current educational system, need to adopt sustainable management based on future higher education instead of clinging to the traditional business-as-usual education. It is our hope that, as the demand for green managers increase, business schools will be eventually converted to the future higher educational institutions.

Green management needs not be limited to business, however. For the sustainability of society, green management skills of all levels become essential, from communities and institutions to the government, because all sectors of the society have to cooperate under a shared vision of sustainability.

Hence, future higher education of future-oriented studies and system dynamics becomes very important for every member of the society, and it can be effectively learned through a continued learning style. It will indeed become a life-long pursuit of self-awareness of ourselves and our environment for sustainability. College diploma and professional qualifications provided by the current institutions are nothing but a first step toward a life-long process of future higher education. Those who pursue future higher education furthermore will be rewarded with better opportunities in their workplace, community and society for better futures.

Costs of Learning

Costs of education keeps increasing as human resources and research facilities for knowledge-based education are more and more required. Under the

circumstances, many parents are having difficulties to pay tuition fees for their kids. To be worse, public educational institutions are losing social support world wide due to the influence of recent globalization and free market economy. Accordingly, many kids have no choice but to attend expensive private institutions.

We are facing another important question: Who should pay the costs of education? Higher education provides two roles: advances of the accumulated knowledge for the welfare of society, and career developing opportunity to the well-educated. For the former society should pay for the higher education, for the latter beneficiary should pay by themselves.

Future higher educational system we recommend here is supposed to cope with sustainability issue we face. Therefore, the question of who should pay the cost of future higher education becomes the same as asking who should pay for the sustainability of society. Even so, future higher education should bear the same two role as traditional one. There is no reason to differentiate the educational costs among them. Learning costs of future higher education, therefore, have to be appropriately shared both by the society and the beneficiary.

Conclusions

The most impending issue we are now facing is sustainability of our society. Yet current higher education consisting of fragmented fields of studies fails to cope with it. To be worse, it could be a main cause of the issue itself. We need to establish future higher education, outside current educational system, that brings the fragmented parts into the whole. This reverse movement can be done by the two field: future-oriented studies and system dynamics.

IT technologies will help this movement through networking and continued learning. Front runners in this trend are business schools. Accordingly, sustainable future depends on how business schools, which luckily stands outside current educational system, could adopt sustainable management based on future higher education instead of clinging to the traditional business-as-usual education.

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Brief Biography

The author is professor at the Graduate School of Business, Doshisha University, Kyoto, Japan, and currently teaches system dynamics and economics. He received Ph.D. in economic theory from the University of California, Berkeley, and since then, has been actively engaged in the research of futures studies and system dynamics modeling. He is fellows of the World Futures Studies Federation and the World Academy of Art and Science.