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RIHE International Seminar Reports

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Report of the International Workshop on Graduate Education, 2009

Organized by: Research Institute for Higher Education, Hiroshima University

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FOREWORD

Higher Education in Japan is now facing great and difficult challenges. These challenges are the consequence of recent and rapid socio-economic changes, including globalization, the emergence of a knowledge-based society, and the ageing of society as the number of young people declines. We believe that higher education in Japan must adapt to the new environment by a process of universities reforming themselves. Graduate education is no exception. It is expected to play a greater role in the future of Japan. Graduate education contributes enormously to society in terms of economic growth and social welfare, both by training highly talented people and also by performing advanced research focused on social and industrial needs. To date, however, reform of graduate education is still a 'work in progress' that has yet to reach its goal. We need to share understanding of graduate education with each other and strive to lift it to the level that is required.

In this situation, the Research Institute for Higher Education (RIHE) in Hiroshima University, through being specially funded by the Ministry of Education and Science in 2008, has been able to implement a new research project on the reform of higher education in the knowledge-based society of the 21st century. Research on graduate education is a very important part of this project. Thus RIHE hosted the second International Workshop on Graduate Education under the theme of "Producing Qualified Graduates and Assuring Education Quality in the Knowledge-based Society: roles and issues of graduate education", which was followed by the 37th Annual Study Meeting on Graduate Education in Japan.

We invited four speakers whose activities are internationally recognized: Professor Simon Marginson, University of Melbourne, Australia, Professor Emeritus Ryo Hirasawa, University of Tokyo, Ms Lesley Wilson, European University Association, and Professor Chen Siangming, Peking University. In addition to these speakers, we were pleased that Professor Masuo Aizawa, Executive Member of Council for Science and Technology Policy of Japan was able to accept our invitation to deliver a special lecture. I sincerely appreciate the contributions of the five guests to the International Workshop.

I hope that this volume will contribute to understanding for those who are interested in both graduate education matters and science/technology systems around the world as well as in Japan.

August 2010

Shinichi Yamamoto
Director and Professor,
Research Institute for Higher Education,
Hiroshima University

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Acknowledgement

We would like to acknowledge the invaluable contribution of Professor Keith J. Morgan, visiting professor at RIHE, Hiroshima University, who edited all the manuscripts in this report.

Shinichi Yamamoto
Director & Professor,
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Keynote Speeches

Global movements in research labour and doctoral students: strategic implications for national systems and universities

Simon M. Marginson*

Introduction

The paper focuses on global aspects of research and doctoral education and considers practical implications of the increasingly global character of both. Here scholar-researchers are working 'in the dark'. The globalization of knowledge in the real world has moved ahead of empirical research on the topic and of theorisms and models designed to understand it. Nor have the mostly national policy systems governing higher education and research in different countries fully grasped the nature and extent of the global changes now taking place. The paper, which is necessarily brief and schematic, is designed to stimulate thinking about the implications of the part-globalization of knowledge for doctoral education and research organization in national systems and in research-intensive universities. It is pitched at the level of 'the perspective of the world' (Braudel, 1985) so as to develop an overview of trends. The circumstances described in general terms in this paper play out differently from nation to nation. The propositions and summations here need to be tested for relevance and applicability in each specific national and local site.

The paper defines global integration and convergence, and reflects on the implications of the location of higher education at the intersection of the global, national and local dimensions of action. It then considers more closely the way the global dimension of education and research is being created. The final part

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of the paper considers the implications of globalization for policy on research and doctoral mobility. The paper does not provide quantitative data on the mobility of researchers and graduate students, but rests on a prior review of existing data-sets (Marginson, 2009).

Global, national and local

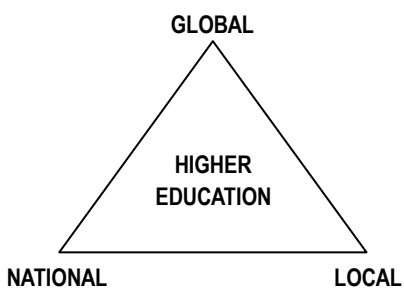
A useful short definition of 'globalization' is that of David Held and colleagues in *Global Transformations*: 'The widening, deepening and speeding up of inter-connectedness on a world-wide scale' (Held, McLew, Goldblatt & Perraton, 1999, p.2). In higher education this plays out in the growing role of worldwide systems at national and local level. In human life as a whole the outstanding example of a global or one-world system is that of ecology. Increasingly, we recognize that eco-systems are interdependent. In higher education the outstanding example is that of systems related to knowledge and publication in the sciences. For example, across the world academic faculty are increasingly required to publish in the English-language journals that comprise the global science system. Global rankings and other forms of cross-country comparisons between universities and between their programs and research are watched closely. The global mobility of students and staff has led to the evolution of formal and informal systems for making judgements about the quality of qualifications and institutions from other countries. Another manifestation of globalization is the use of policy borrowing from abroad in national systems (King, 2009) and the closer cross-border resemblance between universities in the manner in which they are organized, though distinctive national faculty cultures continue (for more discussion of the impact of globalization in higher education and research (see for example Marginson & van der Wende, 2009; Marginson, Kaur & Sawir, in press).

Institutions devoted to higher education and research, especially the leading research universities, play a key role in the processes of globalization. Higher education does not simply respond to globalization, it is one of the driving forces. The same point can be made about national systems of higher education. While some systems adopt a largely defensive posture in relation to global trends, many nations actively contribute to changes at the global level of higher education and research. Higher education and research are practised in three distinct but interrelated domains of human action – the global dimension, the national dimension, and the local dimension. In the present era of communicative globalization, which dates from the cheapening of air travel and the emergence

of the Internet two decades ago, the global dimension has become more important than it was before. It exercises an increasingly influence in relation to thinking and action in the national and local dimensions. It is important to emphasize also that the local dimension retains autonomy and distinctive strategies and activities can be created there. Likewise there continues to be space for national system distinctiveness in higher education and research – though the nation is no longer the outer limit of what is possible, and all nations are increasingly affected by trends and relationships at the world level.

Research universities must now operate in three dimensions of action at the same time. The first dimension, easiest to recognize, is the local dimension − the day-to-day life of institutions, localities, communities and sites of employment. The second dimension is the national dimension – national culture and polity and systems, policies, laws and regulations. Universities have long been important for nation-building governments. Given the power of skills and innovation in modern economies, and the need for an equitable structure of opportunity, they are more central now. Universities also need governments, which are their most important source of funding. Government resourcing often brings with it unwanted control. But universities that eschew the resources of nation-states will falter at the global level. The third dimension is the global dimension (see above). Increasingly, universities operate independently of national government when they are operating globally. But governments may be reluctant to resource independent activity.

In sum, we are in a "glonacal" era of higher education, where glonacal indicates some combination of global, national and local factors (Marginson & Rhoades, 2002; Marginson & van der Wende, 2009). Figure 1 sets out in simple form the three dimensions of higher education.



Source of concept: Marginson & Rhoades (2002)

Figure 1. Dimensions of higher education

This glonacal environment is complex and demanding. For example, action in the global dimension is transformative of the agency (the subjective mentality) of universities and their staff. They become more globally conscious. We acquire "multiple affiliations" (Sen, 1999) becoming at one and the same time local actors, national citizen-subjects and global players. But becoming more flexible in our thinking is a key to success. This is because universities that effectively coordinate action in the three dimensions, so that each kind of action tends to accommodate the other, or least does not work against the others, will tend to benefit.

However, the main challenge in the global setting is not to become active – most research universities and nations will achieve this – or even to achieve coordination between the dimensions, but to contribute to shaping the global dimension. Only some national traditions will help to shape evolving global systems that affect all. But even small nations, such as Singapore, can achieve this with imaginative strategy.

The glonacal picture needs to be modified in one respect – the role of meta-national regions, such as the European Higher Education Area. The formation of collaborative regions is a logical response to the American domination of worldwide higher education and research. Limited regional cooperation short of a formal architecture, for example synchronization of quality assurance systems on a voluntary basis, can also be constructive. Note that stronger research universities can push regionalization forward by creating cooperation in advance of state decisions.

Creating the global dimension

The global dimension of higher education and research is extraordinarily dynamic. In the last twenty years, especially the last ten, a remarkable list of global strategies has been applied. Some are led by governments, some by universities or their units, and others by publishing companies and other corporations. Often a key initiating role is played by individual university executive leaders. These global strategies have changed the possibilities and the necessities, affecting all national systems and single research universities. The strategies are a mixture of old and new. But this global space-making has been greatly facilitated by synchronous electronic communication and the one-world visualisation enabled by the Internet.

Some of these strategies for creating a global dimension are government-driven, some sustained primarily by institutions of higher education,

some jointly driven. In the case of global comparisons and rankings other agents also play a role.

Government-driven strategies

Capacity building in research Many (though not all) national governments believe that expanded investment in basic research is one key to future economic competitiveness. This "arms race in innovation" has been accelerated by the growth of knowledge-intensive production within the economy, and the emergence of global research rankings, which provide a measure of comparative knowledge economy "firepower" (OECD, 2008a, Marginson & van der Wende, 2009). The main zones of accelerated investment in basic research are in China (Li, Whalley, Zhang & Zhao, 2008), Korea, Taiwan China and Singapore; in Western Europe (EC, 2007), notably Germany and France (Salmi, 2009); and in the USA where the Obama administration has announced that it will double National Science Foundation and National Health Institute research funding. By growing their investment in basic research these national systems are securing a heightened capacity to compete on the global scale for the best doctoral students, post-doctoral researcher-scholars, and senior researchers; and hence a growing share of the significant intellectual discoveries. Growth of capacity in basic research can also feed into industrial innovations providing other conditions are right.

Global hubs Global education hubs are designed to position a particular national system or city within the global setting as a pole of attraction to foreign students and investment capital in education. The hub may also include a focus on research, industry innovation, and capital for R&D and commercialisation. The idea is to position the nation/city as a centre of global and regional development. Governments pursuing the hub strategy usually invest in infrastructure and offer favourable terms to foreign providers who locate on site. The first global knowledge hub was the Singapore "Global Schoolhouse" (Kong, Gibson, Khoo & Semple, 2006; Sidhu, 2009). Malaysia and Mauritius have also set out to become global educational hubs, and Hong Kong is giving thought to a similar strategy. The United Arab Emirates and Qatar are attempting something similar. It is likely that the hub strategy will only work if the city and nation are sufficiently attractive to foreign capital and personnel for more reasons than just the investment in educational infrastructure. The hub location must have enough drawing power in its own right to attract long term migrants. A successful hub cannot be created in a vacuum by education alone (Marginson, 2010).

Global higher education as a trading system (WTO-GATS): The other government strategy for building the global dimension of higher education and research is a multilateral one that is designed to remake the whole global dimension of higher education. The WTO-GATS negotiations set out to create an open global trading regime in designated services sectors, including educational services (OECD, 2004). This agenda emerged out of the successive rounds of global trade talks. It is now clear that WTO-GATS will not achieve its original objectives. Most national governments have little intrinsic interest in holistically remaking education as a tradable commodity. Education is largely produced in non-commercial settings; and governments want to retain control of higher education and research.

Institution-driven strategies

Partnerships and consortia Cross-border partnerships between universities, a long-existing strategy, have become more important in the last 15 years. Partnerships facilitate resource sharing, people exchange, mutual benchmarking, joint degrees between universities from different countries, and twinning programs across borders where students do parts of their degrees in each country. Multi-agent networks or consortia are the extended family version of institutional partnerships. Typically their membership spans the globe or a region within it such as Europe, Asia-Pacific or East Asia. Though consortia always involve information sharing, they do not all generate new activity. Nor do they constrain it. It might appear that consortia imply an opportunity cost but universities can keep their options open: presidents of research universities normally retain the strategic freedom to deal with whomsoever they want. The extent to which a consortium is active and influences its members partly depends on the energy of the consortium secretariat. If alliances last, potentials can deepen over time.

Transnational education Transnational education means the enrolment of students in a nation other than the home nation of the educational institution (Verbik & Merkeley, 2006; Ziguras & McBurnie, 2006). The institution becomes the foreigner and the international student is at home − rather than, as in the case of education export, the international student becoming the foreigner while the institution stays at home. Transnational education is produced by distance education or via a branch campus. Branch campuses are in two forms. The first is the stand-alone campus owned or rented and operated solely by the transnational institution. The second and more common model is collaboration with a local partner. All forms of transnational education take the production of

education out of the national jurisdiction of the institution and into the national jurisdiction of another government. Transnational institutions also continue to be shaped by their own regulatory setting, at least in their home country activities. Thus once they move offshore they acquire dual identity. It is harder for any one government to control the university's activity, but at the same time the university must deal with both governments. Transnational education has the potential to affect the development of education in the location, through competition with local institutions and through the models it provides. At the same time, transnational campuses often find themselves adapting curriculum and pedagogy in part for the local setting. They acquire a more culturally plural approach and this can feed back to the metropolitan institution, broadening its approach to teaching. Potentially, transnational education is transformative in both countries.

Global e-universities The delivery of educational programs through the Internet has the potential to evade the regulatory powers of governments in both the provider nation and the nation where program delivery occurs. It takes production straight into the global dimension and invites the student to follow. There is an attractive if grandiose simplicity about the Global e-U concept. It opens the prospect of a single global classroom, and a universe of virtual institutions, a parallel universe to that of face-to-face universities. At the end of the 1990s much was invested in e-U ventures, especially in the USA and through the UK e-university. There was little student take-up. It is now apparent that except for students working full-time, e-degrees have limited appeal (OECD, 2005). They lack status compared to on-site programs; and most students prefer the teaching and networking benefits of face-to-face delivery.

Jointly-driven strategies

Export of education One of the more successful global strategies is commercial education exports (Bashir, 2007; Verbik & Lasanowski, 2007). The running of the programs for foreign students as a business grew out of the long role of the English-speaking countries in educating foreign aid scholarship students and private international students after world war two. However the primary purpose has shifted from aid to trade. The main policy objective of educational export is to generate revenues for the nations and institutions concerned. The growth of commercial educational exports in the UK, Australia, New Zealand, Malaysia, Singapore, China and elsewhere has been supported by government regulation and national positioning strategies in each country, and also powered directly by the recruitment activities of the institutions themselves.

In the UK, Australia and New Zealand growth has been facilitated also by deregulation of international student numbers. This contrasts with the education of domestic students which is largely subsidized and regulated by government (though from 2012 onwards it will be deregulated in Australia). Under these arrangements universities and other institutions enrol as many foreign students as they wish; and because they can set their own prices and level of unit surplus there is a strong incentive to expand. However, in other national systems where foreign education is run on a subsidized, not a commercial basis, and the objectives are those of intercultural education and foreign policy not export income, there is usually a quota on numbers. Education export is potentially transformative. It draws global capital flows and flows of talent into exporting nations and strengthens the global presence of their institutions. It also augments global convergence. International students maintain contact with families and friends at home while engaging with the country of education. As they struggle to survive and change in the new country they draw the world closer together. This is global integration on the scale of millions.

Knowledge cities Knowledge cities are a more modest but more effective version of the "hub" strategy. Typically they are driven by universities in concert with local government, and sometimes with provincial or national government. It is again a place-based capacity building strategy, like research concentration and the hubs, designed to draw to a location global flows of knowledge and innovation, talent and money. Like hubs it suggests infrastructure investment, precinct architecture, worldwide marketing, visa policies that facilitate the mobility of talent, and other inducements and conditions designed to make the city and its institutions attractive.

Region-building in higher education Small-sized to medium-sized higher education systems, lacking the fire-power of the USA or China, have limited capacity to set the rules of global engagement, even with highly creative strategies like the Singapore Global Schoolhouse Strategy. This suggests that where feasible, regionalization of capacity and people mobility, particularly in research, can create mutual strength at the global level. There are four conditions for successful regional organization: geographical proximity, cultural conformity, a sufficient development of educational infrastructure, and political will. In the absence of political will, geography and culture are not enough. This is why regionalization is not a factor in East Asia at this time. In higher education and research the only zone that clearly fulfils all the conditions for regionalization is Europe (van der Wende, 2008; Kehm, Huisman & Stensaker,

Eds., 2009; van Vught, Ed., 2009). There regionalization is pursued both top-down through inter-governmental structures and the European Commission, and bottom-up in negotiations and exchange between institutions. Regionalization is building the coherence, resource sharing and long-term global impact of the European Higher Education Area. In Southeast Asia ASEAN maintains a framework of collaborative programs, though these are largely marginal to national systems.

Multiple actor strategies

Global comparisons and rankings The comparison and ranking of national systems and individual institutions – in general as in "best university" lists, and in relation to research performance – have fecund potentials to reshape higher education. Ranking has proved much more potent than the WTO-GATS agenda. It has also done more than has the WTO to advance the organization of higher education as a market, by defining the field of competition, standardizing the criteria and setting institutions and nations directly against each other. At the same time comparison and ranking also provide certain data that facilitate mutual recognition and collaboration. The potential for collaboration is impaired by hierarchical forms of ranking, which marginalize institutions with low resources, and subordinate national systems whose main language is not English. This makes necessary the creation of flatter systems of comparison, which bring more diverse forms of knowledge and culture into the frame.

Ranking is a multi-actor business. It takes in publishing companies including the Times and US News; university centres as at Jiao Tong, Leiden, and CHE in Germany, and UNAM in Mexico (CWTS, 2009; SJTUGSE, 2009); government bodies as in the research rankings by the Higher Education Evaluation and Accreditation Council of Taiwan; and independent groups as in webometrics (2010) which compares the web visibility and utility of institutions and helps to drive web publishing. The OECD (2008b) is developing comparative measures of learning outcomes in higher education. There are more involved in ranking institutions at the national level. Alongside rankings, classification systems are emerging, so that institutions can be ranked in groups according to mission. The European national systems are moving to both multi-layer classifications and multi-purpose rankings. This will make it possible to fully comprehend the European wide sector of higher education for the first time (Bartlese & van Vught, 2007; van Vught, Ed., 2009). There are also plans to extend the European process to the global level. In East and Southeast Asia, regional comparisons are likely to emerge. There is no activity

more powerful in creating the global dimension of higher education and research than is global comparison and ranking.

Implications

The development of a global dimension of action has several implications for policy on graduate and career research. This paper draws attention to three of these.

Central mediating role of global comparison and ranking

University rankings function as a meta-performance indicator. It seems that all nations want more universities in the top 500, the top 100 or the top 20. Every university president wants his or her university to rise in the eyes of the world and rankings provide a clear-cut indicator. Rankings and global competition in general have installed a universal culture in which all universities involved in research and doctoral education want to become "World Class Universities" (SJTUGSE, 2009) as identified by rankings. Research on the effects of rankings shows that they are influential in the perspectives and decisions of governments, universities themselves, their staff, prospective students, and private investors in education and research (Hazelkorn, 2008). In sum, rankings help to shape the patterns of mobility of talent. Universities must focus on performance and its marketing. This creates serious difficulties for universities in emerging countries which do not have sufficient resources to claim "World Class" status, for example by paying researchers salaries at global rates.

Building both research capacity and connectivity

Another implication of the emerging global dimension is that higher education systems, and individual research universities, now need to build research capacity at home and improve cooperation with other national research systems. The two sets of activities are complementary. Only nations with good basic research across a full set of fields can secure full access to the global knowledge system, while providing training for the researchers who will work in industry and universities in future.

The twin need, for capacity at home and collaboration abroad, has led national policy makers and research universities in most countries to place positive values on graduate and researcher mobility, joint cross-border projects, and 'internationalization' of universities. A key issue to monitor and resolve is

the balance between PhD training at home and PhD training abroad. A comprehensive pattern of local training provides essential research capacity in the national system. PhD training abroad broadens access to the range of ideas and methods accessed by researchers and enhances their communicative and intellectual capacities to operate freely on the global plane. It also creates conditions for sustainable long-term collaborations across borders. This suggests both kinds of doctoral training are needed, and if the balance tips too far towards one or the other, global effectiveness is weakened.

Global competition for mobile talent

The final implication of globalisation and global strategy-making is that the global competition for mobile talent is now a powerful driver of university and national decision-making. First, institutions need to be able to compete effectively for high performance researchers. A small number of scientists, those able to generate high volume publications and citations, have become strategically significant – because of their potential contribution to knowledge discovery and industrial innovation; and because their presence enhances the rankings position. Note however that in the case of researchers working in basic inquiry, the commercial fruits from their work are only to be captured by the national innovation system if there are nation-based industries able to finance and market the commercial applications. Otherwise the economic benefits of the work are picked up by firms in other nations.

Second, national systems and universities also compete globally as sites of doctoral research and post-doctoral research. Nations and institutions able to attract significant numbers of foreign doctoral students and researchers can enhance research performance. Those that cannot attract foreign talent also face the problem of holding onto their own national-origin talent. Systems that fail to compete effectively in the global market in advanced research skills face net brain-drain and at worst, a decoupling from the worldwide knowledge system. Even strong research systems like that of Germany have been weakened by brain-drain (Berning, 2004).

Here the American higher education system has proven effectively competitive on the world scale. It provides relatively generous start-up conditions, scholarships and ongoing part-time work for doctoral students, and the majority of the world's post-doctoral research posts. It also loses relatively few home-grown researchers of note. Thus the USA has been a magnet for talented people from all over the world. Many stay in the USA on a long-term basis. This creates difficulties for other nations, nearly all of which experience

a net brain-drain in relation to the USA.

The globalization of research should not be exaggerated. National systems of training, recruitment, promotion and the structuring of the academic profession remain quite diverse on the world-scale, even in Western Europe (Musselin, 2005) where regional integration is greatest. Though nations all compete for stellar scientists, those scientists enter into differing salary and career regimes, which weakens the extent to which a single labour market competition takes place.

However global market forces are at work, even if their operation is somewhat inhibited and fragmented; and diversity does not always protect national higher education systems. Some countries weaken their competitive position by maintaining career systems and migration regimes relatively closed to outsiders, and/or levels of salary that are too low. Doctoral students tend to prefer countries where there will be opportunities after graduation. Notwithstanding those barriers doctoral education appears to becoming more internationalised overall (Marginson, 2009 reviews the evidence). The presence of foreign doctoral student varies markedly by nation. About one quarter of all doctoral students in the USA and Australia are international, one third in Canada, and half in the UK. The proportion is also high in the Netherlands and Spain. It is relatively low in most of the rest of Europe. Some systems have much stronger international connections through this mechanism than others.

In summary, issues related to the global flow of talent are largely conveyed by the answers to the following questions.

- Are graduate student scholarships sufficiently attractive to (1) retain nationals and (2) attract foreigners in the face of global competition for talent?
- How competitive are the opportunities and support offered to post-doctoral scholars and researchers?
- Does the system/university provide sufficient support in the form of research grants and infrastructure?
- What language is used in graduate education? The use of English facilitates global recruitment power.
- How accessible is the academic career structure to foreigners? Can they get jobs at all? Permanent jobs? Full professorships? How readily?
- What is the immigration regime and its functional speed of processing? Can foreigners become citizens?

- How closely do the key structural features of the career system – such as forms of doctoral training, entry into career positions, tenure, promotion at all levels – approximate those in other nations? How do these structural factors affect mobility?
- How do salaries and conditions of work, relative to costs, compare and compete?
- What about associated living conditions such as housing availability? How welcome are foreigners in institutions and neighbourhoods?

National systems and universities able to tackle these questions will be best placed to influence the content and shape of the evolving global knowledge system.

References

Bartelse, J., & van Vught, F. (2007). Institutional profiles: Towards a typology of higher education institutions in Europe. *IAU Horizons*, *12* (2-3), 9-11.

Bashir, S. (2007). *Trends in international trade in higher education: Implications and options for developing countries* (Education Working Paper Series, Number 6). Washington: The World Bank.

Berning, E. (2004). Petrified structures and still little autonomy and flexibility: Country report Germany. In J. Enders, & E. de Weert (Eds.), *The International Attractiveness of the Academic Workplace in Europe* (pp.160-182). Frankfurt: Herausgeber und Bestelladresse.

Braudel, F. (1985). The perspective of the world. In S. Reynolds (Trans.), *Civilisation and Capitalism 15th-18th Century, vol.3*. New York: Fontana Press.

Centre for Science and Technology Studies Leiden University (CWTS). (2007). *The Leiden ranking 2008*. Retrieved May 3, 2009 from http://www.cwts.nl/ranking/LeidenRankingWebSite.html

Enders, J., & Fulton, O. (2002). Blurring boundaries and blistering institutions: An Introduction. In J. Enders, & O. Fulton (Eds.), *Higher education in a globalizing world* (pp.1-16). Dordrecht: Kluwer.

European Commission (EC). (2007). *Lisbon declaration. Europe's universities beyond 2010: Diversity with a common purpose*. Retrieved April 30, 2009 from http://www.eua.be/fileadmin/user_upload/files/Lisbon_Convention/Lisbon_Declaration.pdf

Hazelkorn, E. (2008). Learning to live with league tables and ranking: The experience of

institutional leaders. *Higher Education Policy*, *21*, 193-215.

Held, D., McLew, A., Goldblatt, D., & Perraton, J. (1999). *Global transformations: Politics, economics and culture*. Stanford: Stanford University Press.

Kehm, B., Huisman, J., & Stensaker, B. (Eds.) (2009). *The European Higher Education Area: Perspective on a moving target*. Rotterdam: Sense Publishers.

King, R. (2009). *Governing universities globally: Organisations, regulation and ranking*. Cheltenham: Edward Elgar.

Kong, L., Gibson, C., Khoo, L., & Semple, A. (2006). Knowledges of the creative economy. Towards a relational geography of diffusion and adaptation in Asia. *Asia Pacific Viewpoint*, *47* (2), 173-194.

Li, Y., Whalley, J., Zhang, S., & Zhao, X. (2008). *The higher educational transformation of China and its global implications* (NBER Working Paper No.13849). Cambridge: National Bureau of Economic Research.

Marginson, S. (2009). The academic professions in the global era. In J. Enders, & E. de Weert (Eds.), *The academic profession and the modernization of higher education: Analytical and comparative perspectives* (pp.96-113). Dordrecht: Springer.

Marginson, S. (2010). Making space in higher education. In S. Marginson, P. Murphy, & M. Peters. *Global Creation: Space, mobility and synchrony in the age of the knowledge economy* (pp.150-200). New York: Peter Lang.

Marginson, S., Kaur, S., & Sawir, E. (in press). *Higher education in the Asia-Pacific: Strategic responses to Globalization*. Dordrecht: Springer.

Marginson, S., & Rhoades, G. (2002). Beyond national states, markets, and systems of higher education: A glonacal agency heuristic. *Higher Education*, *43* (3), 281-309.

Marginson, S., & van der Wende, M. (2009). The new global landscape of nations and institutions. In OECD, Centre for Educational Research and Innovation (Ed.), *Higher education to 2030, Volume 2: Globalization* (pp.17-62). Paris: OECD.

Musselin, C. (2005). European academic labour markets in transition. *Higher Education, 49*, 135-154.

Organisation for Economic Cooperation and Development (OECD). (2004). *Internationa lization and trade in higher education*. Paris: OECD.

OECD (2005). *E-learning in Tertiary Education: Where do we stand?* Paris: OECD.

OECD (2008a). *Tertiary education for the knowledge society: OECD thematic review of tertiary education*. Paris: OECD.

OECD (2008b). *Roadmap for the OECD Assessment of Higher Education Learning Outcomes (AHELO) feasibility study* (IMHE Governing Board, Document Number JT03248577). Paris: OECD.

Salmi, J. (2009). *The challenge of establishing world class universities*. Washington: World Bank.

Sen, A. (1999). Global justice: Beyond international equity. In I. Kaul, I. Grunberg, & M. Stern (Eds.), *Global public goods: International cooperation in the 21st century* (pp.116-125). New York: Oxford University Press.

Shanghai Jiao Tong University Graduate School of Education (SJTUGSE). (2010). *Aca demic Ranking of World Universities*. Retrieved February 15, 2010 from http://ed.sjtu.edu.cn/ranking.htm

Sidhu, R. (2009). The "brand name" research university goes global. *Higher Education*, *57*, 125-140.

van der Wende, M. (2008). Rankings and classifications in higher education: A European perspective. In J. Smart (Ed.), *Higher Education: Handbook of theory and research*. Dordrecht: Springer.

Verbik, L., & Merkley, C. (2006). *The international branch campus − Models and trends*. London: Observatory on Borderless Higher Education.

Verbik, L., & Lasanowski, V. (2007). *International student mobility: Patterns and trends* (Report, The Observatory on Borderless Education). Retrieved March 21, 2008 from www.obhe.ac.uk [password protected]

van Vught, F. (Ed.) (2009). *Mapping the higher education landscape: Towards a European classification of higher education*. Heidelberg: Springer.

webometrics (2010). *Ranking web of world universities*. Retrieved March 2, 2010 from http://www.webometrics.info/

Ziguras, C., & McBurnie, G. (2006). *Transnational education: Issues and trends in off-shore higher education*. London: Routledge.

Mission-oriented knowledge system in graduate schools: how can we ingrain it and assure the quality?

Ryo Hirasawa*

I. Background

In June 1999, the World Conference on Science, the first global conference on science and society in nearly twenty years, took place in Budapest. Organized by UNESCO and the International Council for Science (ICSU), the conference resulted in an announcement entitled the "Declaration on Science and the Use of Scientific Knowledge," which called for a synthesis of traditional and modern knowledge and methods. Written output from this conference described how "Modern scientific knowledge and traditional knowledge should be brought closer together in interdisciplinary projects" (UNESCO, 1999). Scientists in attendance hoped to set a new tone for scientific inquiry in the 21st century, reflecting this need to further "Science for Knowledge," while simultaneously promoting a "Science for Society" closely linked with 'development,' 'peace,' and 'sustainability.'

Ten years later, where does Japan stand with regard to developing "Science for Society"? In 2000, the Science Council of Japan [*Nihon Gakujutsu Kaigi*], established in 1949 as a "special organization" under the jurisdiction of the Prime Minister, recommended that "R&D of Social Technology" be promoted; it later established the Research System of Social Technology in 2001, which was later transformed to the Research Institute of S&T for Society in 2003. The Council for Science and Technology Policy (CSTP; *Sogo Kagakugijutsu Kaigi*),

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established in 2001 within the Cabinet Office, helped launch the Super-COE[1] Program in 2001 to encourage development of strategic research centers focused on organizational and managerial innovation and building a core research center, with a focus on being competitive at the international level.

However, despite these high-level government initiatives, the Japanese public R&D system and universities have yet to incorporate key concepts from the above mentioned Conference's announcement. Graduate school students (and young researchers who have recently completed graduate school) are the "fuel" of R&D; by looking at case studies in Japan, I will introduce general problems in graduate schools before introducing the two issues central to understanding and solving those problems. Finally, I will demonstrate why reorienting research as mission-oriented, rather than discipline-based, is a key for the long-term success of Japanese R&D and the most effective way to carry out "Science for Society." Lastly, by discussing reasons for failure in the past, I will propose concrete steps to help mission-oriented research take root in graduate programs.

II. Issue ascertainment and formulation

The following are the most pressing issues facing graduate schools in Japan:

1) enrollment not reaching capacity,
2) slow response to society's needs,
3) curricula with too much emphasis on discipline-based thinking,
4) while there has been a recent increase in short-term positions for young researchers, there are still few choices for a long-term career path after graduate school.

This last factor must be addressed by creating positive incentives, including a sense of career continuity and job security, for talented, young researchers. Without a stable career choice, why would young people enter into research-oriented fields? This phenomenon has a profound impact on the Japanese R&D system.

What is the solution? First, we establish a clear goal: fixing the system by not just looking at the average level of graduate students, but focusing on

[1] COE: Center of Excellence

cultivating top-level students who can compete on an international level in science and technology (S&T). The issues related to this goal fall into two general themes.

1) Exploration of new science and technology: the beginning pathway for this pursuit is discipline-oriented research, while emphasizing creation of Networks of Excellence (NoE); however, there must also be a transition to move beyond disciplinarity, in order to pioneer "frontier" fields and take on transformative challenges.
2) Research must realize socio-economic needs: as mentioned earlier, the best pathway to realize this is mission-oriented research.

What is mission-oriented research? First, I will define concepts by using Michael Gibbons' Mode Theory. Gibbons and his colleagues have organized much of the recent thinking in a distinction between two modes of knowledge production (Arnold, 2001). Gibbons defines modes by using contrasting pairs, such as monodisciplinary vs. interdisciplinary, knowledge-oriented vs. needs-oriented, and individual effort vs. organizational pursuit. While theoretically they have not been sufficiently developed, these pairs were induced based on actual cases. Gibbons helps us understand how pressing social issues are treated in knowledge theory: while Mode 1 is concerned with traditional knowledge-oriented research and disciplinary science, Mode 2 research is "collaborative research with community members and researchers working together and responding to community questions and needs" (Kramer, 2009).

Gibbons asserted that this "new" form of knowledge production, which was context-driven, problem-focused and interdisciplinary, started to emerge from the mid-20th century. He said it involved multidisciplinary teams brought together for short periods of time to work on specific "real world" problems. Gibbons' Mode-theory, however, is prone to creating misunderstanding. One underlying reason for this is confusion due to different definitions of "mode".

These modes are related to the next stage of my argument, which is the need to distinguish between research that produces scientific and technological knowledge (STK), and research that produces socio-economic value (SEV). Further, when discussing management and policy supporting this research, I will focus on three aspects: objectives/contents, processes/systems, and actors/stakeholders.

Objectives are critically important: does one emphasize STK or SEV when first embarking on one's research? Obviously, when trying to solve social problems, researchers concentrate on the latter model. Interestingly, there are

graduate-level researchers in Japan conducting STK-oriented research who nonetheless utilize Need-Driven (or Demand-Pull) Nonlinear mechanisms, more than a Seed-Push approach.

Typical STK researchers believe that SEV naturally occurs after STK research, and generally use a Seed-Push linear model in their research process. Learning from case studies of SEV research, however, one sees that SEV research consists not only of socio-economic innovation phases, but also of scientific and technological innovation phases as well. Primarily, SEV uses a Need-Pull Nonlinear model throughout the research process.

Mission-oriented research is primarily concerned with SEV: clear targets are set, an organizational approach towards diverse knowledge is utilized; researchers use a nonlinear approach where separate phases are integrated through many different mechanisms; intra- and inter-organizational collaboration, partnership and networks are emphasized. This approach has historical precedence in Japan: there was gradual institutionalization of this approach in the 1970s and 80s. The approach was conceptualized and formulated into a concrete methodology by U.S. and European researchers, and even utilized in overseas' public administrative organizations and private companies. However, this approach was not sufficiently implemented in the Japanese public R&D system or Japanese universities.

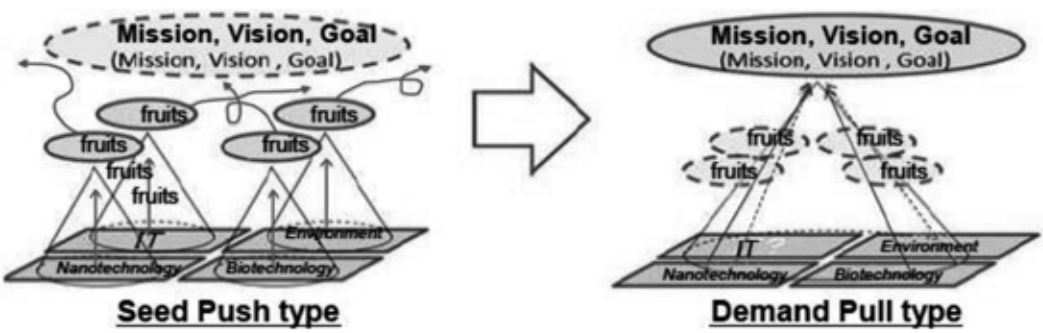

Figure 1. Japan's METI illustrates a changeover in national strategy to "solution type" research (METI 2009) show automobile suspension development over time.

The Japanese government is slowly realizing the importance of needs-driven research: in a paper entitled "Demand-led Innovation Policy in Japan" published by Japan's Ministry of Economy, Trade & Industry (METI) in

September 2009, METI outlines the need for a transition in national technological strategy to a "solution type", where research objectives are based on a "demand pull" concept, in this case resolving urgent national issues (Figure 1).

Phases typically found in research of socio-economic value (SEV), are not limited to society-oriented innovation; research and technological development (RTD); the result of so-called basic research grounded in scientific and technological knowledge (STK), also has research-phases conducted in random order.

In Japan, the research phase concept found in national science and technology statistics is grounded in *kaihatsu kenyku* [development research], rather than basic research, applied research, and development. This concept was pioneered in the Japanese private sector, and became an accepted, commonly used expression. Japan's manufacturing industry from the latter half of the 1970s through to the end of the 1980s, which as I mentioned earlier employed a mission-oriented approach, was also grounded in the "development research" concept.

An analysis of case studies from that time shows that in reality, this meant large-scale research dependent on multiple phases but integrated in a coherent manner. For example, Nissan Motors was a global pioneer in adopting supercomputers into their research (*i.e.* high-performance computing (HPC) critical processes such as structural design) (Simon & Bischof, 1992). The simultaneous simulation of shape design and structural design made possible by HPC, which was categorized as fundamental research, supported several phases of the overall automobile development process.

In my own research, based on publically available data (including patents and scientific papers), on automobile suspension development, we standardized this method into what we called *Doteki Katsudo Renkanzu*, or "Chart of R&D Network Diagram," and successfully used these diagrams to illustrate the development of active suspension in Toyota and Nissan passenger cars.

At Toyota, researchers with clear potential were gradually added to their development division; a development-oriented team and organizational growth model based on reaching clear objectives were built simultaneously. At Nissan Motors, the electronics and engineering laboratories were put under one roof at the Nissan Research Center, giving birth to an inclusive-interactive cooperative model. These examples demonstrate how necessity was the mother of invention: high-level goals were met through integrating research from diverse fields. GM, Ford and Bosch, for example, did not carry out technological

development in an integrated fashion, but rather fostered independent research programs carried out in small, disparate groups. Looking at successful examples within Japan process and assembly industries (a sector where Japan was dominant), examples of this integrated approach to research abound.

At that time, researchers of management science in the U.S. and EU more or less independently transitioned to an approach that looked at actual conditions, constructed an array of models to increase socio-economic innovation, and developed and implemented policy instruments to promote research-innovation policy. However, in Japan, this same model was rarely studied in S&T policy circles; rather, an ineffective and inefficient Seed-Push linear model was and still is used today.

At institutes of higher education, even in the U.S., I believe that Need-Pull and non-linear mechanisms are still not being sufficiently and correctly taught. Similarly in Japan, even though the need to cultivate academic-industry partnerships has long been called for, successful examples of this approach in practice is not common.

III. Evaluation case studies: Super-COE program and OIST

Even though they are not common, I would like to introduce some programs found in Japanese universities that emphasize (or have plans to emphasize) a Need-Pull model. I will discuss evaluations of two programs: the Super-COE Program has 13 distinct sub-programs, and was started in 2001 through funding from the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) to provide "strong support for organizational and management reforms at universities from the aspects of both system and capital" (Yomiuri Shimbun, 2008). The second evaluation is for the Okinawa Advanced Institute for Science and Technology (OAIST) at the yet to be completed Okinawa Institute of Science and Technology (OIST).

There are several points in common between these two programs: both aimed to be international top class Centers of Excellence (COE). Both have became explicitly involved with surrounding society's needs, and evolved to embrace a mission-oriented framework. However, while the Super-COE Program aimed to improve preexisting COE through organizational and managerial innovation, OIST is starting from scratch and, over the course of eight years, aims to become a world-class graduate institution. Super-COE began in 2001; over the course of five-years 13 institutions were selected, and each underwent a five-year implementation period. All the programs will have

been completed this fiscal year.

OIST has plans to be inaugurated as a graduate program under the Cabinet Office during the 2012 fiscal year. At first, the plan was to strengthen its function as a research institution; now, the plan is transitioning to emphasize its role as an education institution.

The following section summarizes important points from evaluations of these two programs.

A. Suggested Organizational Innovations

- Shift to a project-based organizational structure that allows easy project planning; one-fourth of graduate school professors be allocated to collaborate with external researchers; establish additional interface organization to promote and support these collaborations
- Establish a collaboration center in the city, develop off-campus laboratories, and later transition to an "open laboratory" system
- Establish a "free research center" for young independent researchers in which mentors, support staff, equipment, and space are provided
- Build a Venture R&D Center: encourage collaborative partnerships and create support structures to encourage venture research
- Form an International Research Center for young international researchers: institutional protections to be put in place to maintain its status as a special zone
- Create University-Industry Mutual Exchange Centers: enable industry-side researchers working in on-campus labs, while university-side researchers work in partner company's labs
- Take advantage of "seeds" within universities: first establish research institutes in fields where there is great socio-economic need and then establish graduate level courses after a transition period
  (*e.g.* interdisciplinary medical-engineering field, development of digital-media contents)
- Unify activities in two universities: integrate Needs-Side research from one university with Seeds-Side research in another university
  (*e.g.* to create User Science Institute)
- Create a "Think-tank Function" within universities by rearranging research institutes and establish a "solution research institute"
- Pioneer needs-oriented fields
  (*e.g.* sustainability science): an inter-university network responsive to emerging social needs

B. Suggested Managerial Innovations

The following list is aimed particularly at the yet to be completed OIST:

- Establish new kinds of fixed-term posts (*e.g.* specially-appointed professor) freed from the constraints imposed on full-time staff
- Develop a young Independent Researcher System: outstanding performers given opportunity to enter tenure track

The above two concepts are currently being established nationwide.

- Transition to an R&D framework focused on socio-economic targets (*e.g.* new R&D management model, venture development assistance program, subsidy system for startups, and mentor system)
- Development and implementation of new management tools to encourage a collaborative framework (*e.g.* patent maps)
- Development of a proactive recruitment process for inviting and acquiring top class researchers (*e.g.* center for advanced studies, fellowship program, share program, short-time concurrent posts, portable pension, "partner career program", and family support program)

IV. Learning from past evaluations

The abovementioned evaluations led to soul-searching regarding how to improve Japanese graduate schools, the Japanese R&D system, and mission-oriented research being conducted in Japan. First, it was noted that many of the new programs that failed, lacked a high-level advocate (*e.g.* university president, institute director, *etc.*). Such a figure was judged to be especially important during the incubation stage of these programs, in order to protect them from attacks by discipline-oriented researchers. Other failures were attributed to an overdependence on an individual powerbroker or steward; these new programs lacked the necessary teamwork and network-oriented organizational approach, and instead were beholden to a cult of personality.

Many programs employed a Seed-Push Linear Model from start to finish; there was an inability to convert from a seeds-side to a needs-side context. Many of these programs also reflected a bias towards knowledge collection from an analytical point of view; further, there was no attempt at socio-economic value (SEV) creation.

A. Actual Barriers

Actual barriers preventing program success included: intra-organization dynamics; organizational and managerial impediments within the existing system; incompatibility with the pre-existing system; insufficient legislative, cultural and overarching institutional support; unfavorable regulatory environment; time restrictions that led to difficulty in fostering system-level continuity and resulted in an inability to reach a sustainable state.

B. Theoretical Barriers

Theoretical barriers included: conflicts with dominant logic, which includeed contrary viewpoints regarding "truth" inquiry vs. pursuit of effectiveness and/or efficiency, long-term continuity vs. short-term work, and self-contained vs. dependence on external factors. There was also difficulty related to knowledge studies, which led to an inability to recognize plural knowledge modes.

C. Fruitful Framework

I propose the following framework as a low-risk strategy to overcome the above mentioned barriers. First, introduce a "just do it" approach, especially when socio-economic needs are high. Employ an interdisciplinary effort within a needs-oriented paradigm. Recent examples of this include environmental science, medicinal-engineering collaborations, and digital media content (DMC) production. Next, apply a useful knowledge "routine". This is a managerial routine applied to organizational reform, which follows the following sequence: start by changing constituent members, which leads to a resulting change in consciousness thanks to new members; this new consciousness naturally results in a new organizational structure and institutions.

This "routine" can also be applied to organizational design: first brainstorm for ideas or concepts you want realized; next breakdown the constituent requirements of the concept; this is followed by the establishment of "functional agents" (virtual actors) taking on individual constituent requirements; next, confirm the presence of incentives among the actors; finally, build a structure to create "linked" incentives or introduce complimentary systems at locations where there is a lack of incentives.

The "peak" of the approach I have been discussing is design as a "human activity system". Here, an identical result will be achieved regardless of who carries it out (*i.e.* 'scientification' of action). Past successes include user science, solution research, and sustainability science

V. Conclusion

Through looking at case studies and carrying out numerous program evaluations, I have concluded that the following steps must be carried out to realize mission-oriented research which is of direct benefit to society.

A. Establish at least part of the graduate courses and research programs as mission-oriented

This can be accomplished through personnel exchanges with external organizations to introduce mission oriented values, including provision for Professors by Special Appointment ("Specially-Appointed Professors") and Concurrent Professorships.

It is also important to promote awareness-raising through cooperative research and teaching. This can be accomplished by forming "Networks of Excellence" (NoE), which are collaborative research and teaching activities of top-class researchers, and establishing a support system to promote cooperative research built into the framework of a mission-oriented program.

Lastly, it is important to ingrain organization-level reform through the formation of mission-oriented research and teaching institutes, and encourage the establishment of fellowships, scholarships and other incentives to support mission-oriented programs.

B. Fostering mission-oriented researchers

Early-stage care of researchers just starting out is particularly important. We must create awareness and leadership necessary at the top management level, make a conscious effort to separate these researchers' work from discipline-based thinking (and researchers), and create mission-oriented research and learning "zones". There should be a move to allow researchers to be independent and self-reliant through full economic costing (FEC) programs and a "Chairs Program" to give high-level posts (including salary) to competent personnel who will properly act as advocates for young researchers.

C. Establishment of feedback systems to continually improve and deepen experience for mission-oriented researchers

We must work diligently to integrate diverse knowledge fields by creating opportunities to network and by establishing NoE; there must be financial, administrative and legal support for research partnerships and collaborations. Next, we must engage in planning and development of physical infrastructure

and knowledge-systems through the realization of individual components to build the overarching framework, establish "actors" (*i.e.* instruments or stakeholders in these individual components), and integrate these "actors" within the institution. Lastly, there must be a "design of action" through the presence of incentive mechanisms among actor networks, a process optimizing incentive loops, and complimentary systems at locations where there is a lack of incentives.

References

Arnold, E. (2001). *Can We Measure the Socio-economic Effects of Basic Science?* contribution to an Academy of Finland Seminar.

Kramer, D. (2009) *Discussion on Michael Gibbons' work on Mode 2 research and the New Knowledge*. Ontario Knowledge Transfer and Exchange Community of Practice (KTECOP)

METI (2009) *Demand-led Innovation Policy in Japan* (September). Ministry of Economy, Trade & Industry, Japan.

Simon, H., & Bischof, C. (1992). The Implementation of the U.S. High Performance Computing and Communications Program. In H.-W. Meuer (Ed.), *Supercomputer 92* (pp.198-212). Springer Verlag.

UNESCO. (1999). *World Social Science Report*. Paris: UNESCO/Elsevier.

Yomiuri Shimbun (2008). *Founding the "Waseda of the Future" through development in the fields of medicine and life*. Daily Yomiuri Online.

Presentations

Reform in European higher education with a focus on quality assurance and the changing nature of doctoral education

Lesley Wilson* and Andrée Sursock**

This article draws on data collected for EUA's TRENDS 2010 Report that was published in March 2010. TRENDS 2010 analyses the impact of 10 years of Bologna reforms on Europe's universities by using the results of questionnaires received from over 800 universities and other higher education institutions, site visit reports from visits to 28 universities in 16 countries, and material taken from a number of other EUA thematic reports published in recent years. TRENDS 2010 is the sixth in a series of TRENDS reports that have accompanied the development of the Bologna Process since the outset. In 1999 the original TRENDS report provided the basis for the discussion and subsequent adoption of the Bologna Declaration. The remarks on doctoral education are drawn from research done in preparation for a presentation made at a workshop on quality assurance in doctoral education organised by ENQA in Brasov, Romania in March 2009.

Introduction – a decade of reform in European higher education

The last decade has been one of rapid change for European higher education as the continent seeks to remain competitive in the face of rapid global change. The Bologna Declaration was signed in 1999 and the European Higher Education Area will be launched formally at a Ministerial meeting in March 2010, bringing together representatives of the 46 member countries and the

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various stakeholder groups that have been closely involved with the implementation of the reform process. At the same time, the EU's Lisbon Strategy, launched one year later in 2000, aimed to transform Europe into the most competitive knowledge economy in the world, through more emphasis on research and innovation, and expanded access to education and lifelong learning opportunities. The recognition of the importance of higher education institutions and their transformation through the "Modernisation Agenda", that is, enhanced autonomy and improved governance (Communication from the Commission to the Council and the European Parliament, 2006), has become central to achieving these objectives.

The modernisation agenda

In addition to the core Bologna Process reforms, of which the development of quality assurance systems at European, national and institutional level constitutes an important part, information gathered from the members of the European Universities Association (EUA) National Rectors' Conference across Europe shows that most European higher education systems have also had to contend with major policy changes, among them such central issues as the governance and financing of higher education. Most countries have had at least three policy changes underway alongside the Bologna Process. Eleven countries have implemented funding reforms, twelve have changed the legal framework governing institutional autonomy, sixteen have changed their quality assurance processes and fifteen their research policies. In addition, eight rectors' conferences report a significant increase in the number of institutions (mostly church-funded or not-for-profit and for-profit private institutions) while institutions in eleven countries are undergoing (or have undergone) mergers or have been brought together under federated structures (Sursock & Smidt, 2010).

It is in this context that major changes have been taking place in doctoral education across the continent.

Doctoral education

The European tradition of the doctorate – long viewed as the production of a piece of original research under the supervision of one professor, with very little emphasis on taught courses and loose links to the master's degree – started to be increasingly questioned following the broad dissemination and discussion in the academic community of the so-called 'Salzburg Principles' (EUA, 2005), after their adoption by the academic community at a Bologna seminar organised by EUA at the University of Salzburg in February 2005. The main elements of

the Salzburg Principles were taken up by ministers and included in the 2005 Bergen Communiqué. At this time EUA was asked to continue further its work on the topic and presented at the 2007 London Ministerial meeting a more detailed report on doctoral programmes that also included elements of organisation and funding at national level.

Since then, changes at doctoral level across Europe have been most impressive in their depth and speed of implementation. Most probably this success is due to the grassroots nature of these changes while growing international cooperation and the emphasis on early stage researchers and their careers in the context of the European Research Area have certainly been further drivers for change. Intended to improve the overall quality of doctoral education in Europe, changes have focused more particularly on the need to embed doctoral programmes at institutional level and create more critical mass by establishing structures, such as doctoral research or graduate schools, that nurture a dynamic research environment, and by introducing more taught courses and training elements, credit systems or transferable skills provision.

The results of the last three TRENDS Reports demonstrate the rapid progression of these changes in terms of their implementation at institutional level. Responses received show that an increasing number of institutions are offering additional taught courses (52% in 2005; 72% in Trends 2010) and structuring doctoral programmes at institutional level. Trends V already revealed in 2005 a noticeable trend toward the creation of new structures such as research or doctoral graduate schools and other structured programmes. The evidence, both from site visits and from the work of the EUA's Council for Doctoral Education (EUA-CDE), which was created in 2008 to support universities in improving their doctoral programmes, furthermore suggests that such structures facilitate a more stimulating research environment, promote cooperation across disciplines, ensure critical mass, and enhance opportunities for international collaboration and inter-institutional cooperation. They also provide a clear and visible anchor for links with industry, business or public services.

Since then, this trend has continued as Figure 1 indicates.

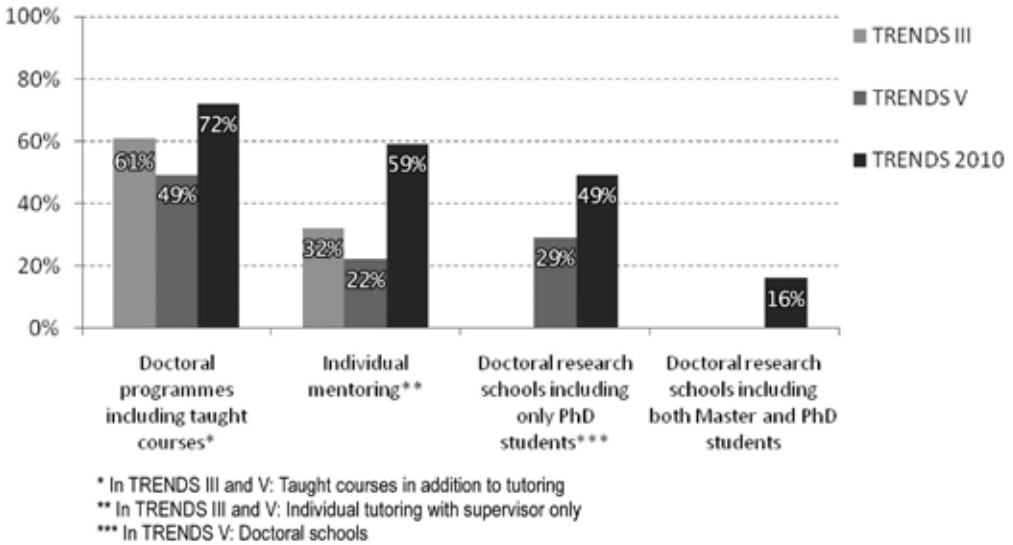

Figure 1. If your institution awards doctoral degrees, what structure exists at your institution?

The establishment of doctoral schools raises many additional questions, for example in relation to the organisation of transparent admission processes, assessment of theses, and monitoring completion rates. Particularly, the move away from the traditional, one-to-one apprentice relationship toward arrangements based on a contract between the doctoral candidate, the supervisor(s) and the institution has implied the need to consider ways to raise and ensure standards of supervision through developing professional training for supervisors. This is being offered at many universities and perceived as a key element of institutional profiling and international competitiveness.

While there is still consensus that original research has to remain the core component of all doctorates there is increased recognition of the importance of transferable skills training for all doctoral candidates. The aim is to raise awareness among doctoral candidates of the importance of recognising and enhancing the skills that they have developed as a means of improving their employment prospects and career development both inside and outside academia. If the non-academic labour market becomes the destination of an increasing number of doctoral candidates, are the generic skills sufficient to meet employers' expectations? Much progress has been made in this area but more needs to be done in order to embed transferable skills development into the education of doctoral candidates.

It is estimated that around 50% of current holders of doctorates are employed outside academia, in businesses, governments, the service sector and other education sectors, holding both research and non-research positions and it is unlikely that the figure will decrease. The DOC-CAREERS project of EUA concludes by noting that:

> The main entry point of employment for doctorate holders into non-academic environments derives from the skills they have acquired through learning to perform research. Employers highly appreciate the level of scientific and technical knowledge held by doctorate holders from European universities, including their formal approach to evidence-based arguments, their analytical skills and ability to integrate knowledge from different sources and their ability to work at the frontiers of knowledge. (EUA, 2009, p.103)

The EUA report points out, however, that companies not focused on research tend to recruit at master's level, "which suggests that the benefits of a doctorate are not yet seen as compelling for careers that involve no formal research component" (EUA, 2009, p.103).

In addition, there are new forms of doctorates emerging such as the industrial doctorate and professional doctorates that allow those working in particular in the professions to pursue doctorates in their professional fields. In both cases the core component remains original research. "Collaborative doctoral programmes, with their exposure to non-university environments, are seen as an excellent way to improve candidates' ability to relate abstract thinking to practical applications and vice-versa, as required for the development of new knowledge, products or services" (EUA, 2009, p.103).

The role of the qualifications framework for the European Higher Education Area

At the Bergen Ministerial Conference in 2005, ministers adopted the Framework for Qualifications of the European Higher Education Area, based broadly on three cycles, with generic descriptors based on learning outcomes, and credit ranges for the first and second cycles, and committed to elaborating compatible national qualifications frameworks (NQF). This commitment was reinforced in the London Communiqué (2007), which stressed the importance of qualifications frameworks as instruments for achieving comparability and transparency within Europe, facilitating the mobility of learners, and helping

institutions in the development of modules and study programmes based on learning outcomes and credits and in the recognition of different types of learning.

The relationship between the qualifications frameworks and the European quality assurance framework described below is crucial. Together these two overarching frameworks constitute the framework in which the Bologna three-cycle degree structure is being implemented and its quality assured. They have been – or in the case of qualifications frameworks, are being – translated into national systems. As qualifications frameworks also provide the overall context for the definition of the three cycle degree structure, for credit ranges and for learning outcomes they are also key to the successful implementation of the Bologna tools in institutions, and thus also to improving the quality of higher education programmes offered throughout the European Higher Education Area.

Quality assurance in European higher education

It is in this environment of far reaching policy reform that the development of a European quality assurance framework, together with the introduction of national QA arrangements and of internal institutional quality processes and mechanisms, has taken place.

A brief historical sketch of quality assurance in Europe

While quality assurance has only become a generalised phenomenon across the continent through the Bologna Process reforms over the last decade, some countries had already developed national systems during the period from the late 1980s to the early 1990s, in particular Denmark, the UK, France and the Netherlands.

More recently, the internationalisation and globalisation of higher education has put renewed emphasis on demonstrating the quality of higher education. The institutional responses received for the TRENDS 2010 report have shown that there is a clear correlation between higher education institutions that have internal quality mechanisms in place and those that pursue active internationalisation and cooperation policies.

However, it is the process of European integration, starting in the 1990s, and then from 1999 onwards the Bologna Process (1999) that has given a major impetus to the growth of quality assurance, as one of the main steering mechanisms in higher education and as part of a perceived need for more accountability.

The door was opened at European level with the adoption of the Maastricht Treaty in 1992. Although the EU's core competence for education and also higher education remains very limited, the Maastricht Treaty articles that relate to Community action in higher education offer the possibility of supporting cooperation between the member states by contributing to the development of quality education. Shortly after this change in the treaties, the European Commission launched a first EC funded pilot project on quality assurance. It was carried out between 1993 and 1996 and supported 46 programme evaluations conducted simultaneously in fifteen EU member states and 2 EFTA countries. The final project report stressed four principles: the independence of the agencies, a self-evaluation, a peer-review visit, and the publication of the evaluation reports. Shortly afterwards EU PHARE programme support was also provided for a similar exercise in the then accession countries of Central and Eastern Europe that have since become EU member states.

Interestingly, these projects also included the then representative body of European universities, the Conference of European Rectors (CRE, one of EUA's predecessor organisations), thus foreshadowing the close involvement of EUA in all later Bologna actions on this crucial topic for universities. It was also at this time (1994) that the CRE launched the Institutional Evaluation Programme (IEP) that has been further developed over the last decade and underpinned EUA's work in the area of quality assurance. Since the establishment of EUA in 2001, quality assurance has been a key area of activity and a considerable effort has been made to ensure that universities are closely involved in the development of both European policy and institutional practice.

On 24 September 1998, the European Council adopted a recommendation to develop European cooperation and networking in quality assurance in higher education and to promote the establishment of quality assurance agencies in Member States. ENQA was established, initially as the European network of quality assurance agencies and later, in 2004, as an association. Through their activities ENQA enables its members to network, discuss and compare quality assurance procedures, and thus contributes to spreading models of quality assurance.

The Bologna Process since 1999 – Creating a European framework for quality assurance

One of the objectives of the Bologna Declaration signed by 29 ministers in June 2009 was to create "a European dimension in quality assurance with comparable criteria and methodologies". This was considered crucial for

achieving a coherent European system and for ensuring that "the European higher education system acquires a worldwide degree of attraction".

As time passed ever more importance was attached by all parties – governments, universities, their staff and students – to quality assurance, and to developing a European framework for cooperation. In particular between 2003 and 2007 this was a major policy objective, hotly debated by all, and addressed in each Ministerial Communiqué.

The Berlin Communiqué (2003): recognised the primary role of higher education institutions in monitoring quality, the first such official acknowledgement in the context of the Bologna Process and one that has been regularly reaffirmed since then, stating that "consistent with the principle of university autonomy, the primary responsibility for quality assurance in higher education lies with each institution itself". It was also at this time that quality assurance agencies, together with students and higher education institutions – through their representative associations, assembled in the "E4 Group" (ENQA, ESU, EUA and EURASHE) – were invited to develop an agreed set of "standards, procedures and guidelines" on quality assurance and to explore the possibility of a "peer-review" of quality assurance agencies.

The Bergen Communiqué (2005): adopted the European Standards and Guidelines (ESGs) proposed by the 'E4', in the form of a text that includes three interrelated sets of standards and guidelines for quality assurance (ESGs): one that applies to internal quality assurance in higher education institutions, a second one referring to the external quality assurance of higher education institutions by agencies and a third set that concerns the quality assurance of quality assurance agencies themselves. The Communiqué also gave the green light for the E4 to explore the possibility of setting up a European register for quality assurance agencies and endorsed the organisation of the European quality assurance forum (EQAF) that EUA has organised on behalf of its E4 partners on an annual basis since then.

The London Communiqué (2007): endorsed the proposal to establish the European Register of Quality Agencies (EQAR) presented, once more, by the E4 Group. EQAR was subsequently established as an association under Belgian law in March 2008. It is managed by the E4 stakeholder associations whose representatives constitute the Executive Board. European governments are invited to join the association as paying members and 25 governments have since done so. The European Register Committee that takes decisions on the inclusion of agencies is made up of independent experts in quality assurance nominated by the stakeholders. This very special structure lends the

organisation the necessary legitimacy and independence it needs to reflect a proper balance between the interests of the different partners in European higher education. The intention is also to show to international partners that through the Bologna Process concertation model Europe has a well organised and transparent quality assurance system, open to all.

Thus, EQAR is the first formal, legal creation of the Bologna Process, and provides a web-based list of "trustworthy" agencies that have been reviewed on the basis of the ESGs. Moreover, the Register is open to applications from all agencies that consider that they comply with the ESGs, not just those based in Europe. At present, after three application rounds, and following the decisions taken at the Register Committee's last meeting in September 2009, the European Register includes 17 quality assurance agencies (http://www.eqar.eu/).

It is possible that the development of EQAR will come to affect the relationship between institutions and national agencies in the future, given that in some systems national regulations allow institutions to turn to any agency listed in EQAR, rather than be required to use their national agency's processes. This is a policy also strongly recommended to member states by the European Commission in it various communications on quality assurance. However, national QA agencies are more reticent about this possible opening up of their markets which would give institutions the opportunity to take their own decisions on which QA arrangements are best suited to their own particular profile and mission.

In conclusion, the present European quality assurance framework is meant as a broad structure to ensure the quality of degree awards, in particular at bachelor's and master's levels. It does not address research activities or other functions of higher education institutions. There is a consensus on four key principles underpinning all activities, namely: the primary role of institutions in managing and monitoring their quality; student participation in internal and external quality assurance processes; the political independence of quality assurance agencies; and the diversity of national quality assurance procedures.

A further defining feature of the developments of the last ten years at European level is that they have been largely stakeholder driven, by the European representative bodies of national quality assurance agencies (ENQA), universities (EUA), other higher education institutions (EURASHE) and students (ESU). Working together in the so-called 'E4' group, as mentioned above, these bodies developed the European Standards and Guidelines (ESG) adopted by ministers in 2007 and are the founding members of and constitute the Executive Board of EQAR.

The state of play at national and institutional level

Establishment of national agencies

In the meantime there are quality evaluation agencies in almost all Bologna signatory countries and even several agencies in some countries, either because of a federal state structure (*e.g.*, Germany, Spain) or the unique situation of the Holy See within Italy, a binary sector (*e.g.*, Ireland) or different institutional statuses and types (*e.g.*, three Austrian quality assurance agencies cater to public universities, private universities and colleges). A few of the agencies have been legally established but are not operational yet or have replaced previous structures and are about to start. Countries without a national quality agency have typically a tiny higher education sector.

Specific European evaluation instruments

In addition, and certainly also in response to the creation of the European quality framework described above, several European evaluation instruments have been developed in recent years. Some of the early examples include the evaluations done by the European veterinarians (piloted in 1985-89), the EUA's Institutional Evaluation Programme (IEP) that was created in 1994 and has since carried out well over 200 institutional audits in 41 countries, and the European Foundation for Management Development's (EFMD) EQUIS Programme launched in 1997 which focuses on the evaluation and accreditation of business schools. After the success of the European "Tuning Project" in benchmarking many disciplines over the last five years, the European Commission has also more recently funded the development of subject specific "quality labels" at European level, for example in music engineering, chemistry and informatics.

Introduction of institutional internal quality processes

In parallel to these developments, the EUA launched a project in 2002 that aimed at enhancing institutions' capacities to develop internal quality processes – introducing the concept of institutional "quality culture". The rationale for the project was that external QA processes were not sufficient to improve quality and must be combined with institutional processes; that it was essential to enhance the self-regulatory capacity of institutions in order to successfully argue for increased institutional autonomy; and that when the institutions' role in quality assurance increases, it might result in 'lighter touch' external quality assurance (EUA, 2006).

Today, most institutions have developed internal quality processes, albeit sometimes at the faculty or departmental level rather than the institutional level.

Institutional responses to the Trends 2010 questionnaire revealed that for 60% of HEIs, one of the most important changes in the past ten years has been enhanced internal quality processes and for 53% enhanced cooperation with other higher education institutions. Moreover, institutions that have primarily a European focus are those that are most likely to evaluate both teaching and research activities regularly, a correlation confirmed by the Trends 2010 site visits. Thus, it has been possible to show progress made in the development of internal quality processes and to demonstrate how important internal quality processes are to inter-institutional cooperation.

Promoting quality in doctoral education

The changes in doctoral education described earlier and the creation of qualifications frameworks have led to more conscious attention being paid by institutions to quality issues and to the type of measures that institutions should be considering in order to effectively monitor the quality of the new 'reformed' European doctoral programmes.

Links between the master's degree and the doctorate

There is a consensus that the third cycle differs significantly from the first and second cycles, but at the same time cannot be seen separately, in particular from the master's level which in most European countries is the entry point to the doctorate. According to the Dublin Descriptors (JQF, 2004), education at the master's level "provides a basis or opportunity for originality in developing or applying ideas often in a research context" and demonstrates "problem solving abilities [applied] in new or unfamiliar environments within a broader (or multidisciplinary) context". Thus, a master's degree is supposed to contain research elements, and as such is the obvious route from which to progress to the third cycle. However, the master's level is not yet stabilised across Europe and varies from country to country.

In a recent EUA survey, Davies notes that while the master's degree is relatively well-defined in terms of its duration and credit points and its level of academic attainment is expressed by agreed level descriptors, "its profile remains clouded by titles and nomenclature which, although usually clear at national level, lose clarity when viewed across external borders." (Davies, 2009, p.7). Sandwiched between the bachelor's degree and the doctorate, it serves multiple purposes. The study identifies several types of master's programmes and notes the problems of having a proliferation of designations and orientations:

- Academic master: used in binary systems to distinguish the university-based programmes from the Professional master awarded by non-university HEIs;
- Consecutive or Continuation master: a master's programme undertaken immediately following, or very soon after a bachelor's qualification in the same discipline;
- Conversion master: a master's study undertaken in a discipline other than that studied in the preceding bachelor's course;
- Joint master: a master's degree delivered by two or more HEIs each awarding one or more diplomas;
- Lifelong master: used in some systems to designate a second cycle provision delivered quite separately from a Consecutive master

(Davies, 2009, pp.12-13)

Thus, while the introduction of the master's degree is a significant innovation in European higher education, the variety in the types of master's awards on offer and their differing research content can be a challenge in managing the transition from the master's to the doctoral level and thus underline the need to consider further the interface between the two levels. One example is the difference in the extent to which specific types of master's degrees involve the completion of a comprehensive scholarly thesis. These are important questions in relation to the 'research pipeline' and ensuring the supply of highly qualified young researchers. They are becoming all the more urgent given the growth of international cooperation and mobility at both master's and doctoral levels, including the establishment of joint master's and doctoral programmes.

The unique nature of doctoral education

Doctoral education is often described as the bridge between research and education and thus also the essential link between the European Higher Education and Research Areas. Universities across the continent have the main responsibility for providing training both in and through research. As the main component of the doctorate is the original research performed by each doctoral candidate, doctoral education cannot be considered and evaluated in the same way as bachelor's and master's programmes. Moreover, and despite new models of multiple supervision, doctoral training is heavily dependent on the one-to-one relationship between the doctoral candidate and the supervisor. This makes evaluation even more challenging and explains that most of Europe's

quality agencies do not have responsibility for evaluating doctoral education.

The large diversity in the organisation of doctoral education across Europe, both at national level and between institutions, presents further challenges. As has been described above, recent developments show an increasing trend towards more structured doctoral programmes and the establishment of doctoral, graduate or research schools and away from the traditional, individual study programmes agreed between the doctoral candidate and the supervisor. This model is increasingly viewed as being unsuited to the preparation of young researchers who will pursue multiple careers both inside and outside of academia. While these changes are occurring rapidly in the sciences and engineering, more traditional structures, however, still tend to be prevalent in the social sciences and humanities.

The new structures being put in place often differ significantly from one institution to another; they are difficult to compare and may have different names, which can lead to confusion or misunderstanding among those not familiar with the system in question. In most countries and institutions, however, a mixture of different models (*i.e.*, both individual and structured study programmes and schools) is a common organisational feature. Thus, there is no one-size-fits-all approach, as with the US graduate school model for example. Different routes are being chosen, tailored to the specific profile, mission and goals of each institution.

This specificity in nature and diversity in the organisation of doctoral education makes evaluation – either internal or external – highly complex. In general, evaluation includes two main but rather distinct aspects: the quality of the doctoral training on offer (educational part) and the quality of research being carried out (including the quality of the research environment, the supervisor and the research team, research outcomes, international reputation). The challenge is for each university to consider its own internal quality processes and mechanisms, taking account of its specific mission and goals, rather than relying only on external standards or purely quantitative methods and checklists that do not take into account the diversity of organisational models and profiles.

Some of the elements of internal quality assurance presently being implemented – even if they are not always understood as such, and thus covered under the overall umbrella of "quality assurance" arrangements within universities – include: the introduction of internal regulations and codes of practice as well as agreements signed between the doctoral candidate, the supervisor and the institution; improvements in standards of access, recruitment and selection; flexible and optional transferable skills training that fits each

candidate's career needs; the introduction of new supervision models including professional development for supervisors; regular monitoring of each doctoral candidate's progress; support for internationalisation and mobility; ensuring high standards of the process of the thesis defence; introduction of procedures for monitoring TTD (time to degree) and completion rates and for tracking doctoral graduates.

With growing institutional diversity and a focus on more distinct institutional profiles, universities are increasingly identifying and implementing internal quality indicators at doctoral level that make sense in their own specific context. Some focus more on improving access, recruitment and selection procedures while others try to enhance the quality of supervision or follow completion rates. The evidence suggests that these various elements of quality assurance are easier to achieve and monitor if doctoral education is structured in one way or another. While this does not mean that there is one model of 'the doctoral school' that works best or is the only way to organise doctoral education, it is clear that the creation of appropriate structures and administrative processes allows for better monitoring of progression and achievement and thus has a major impact on quality.

It is clear that given the growing strategic importance and structuring of doctoral education in universities across Europe, national quality agencies are becoming increasingly interested in including provision for the evaluation or accreditation of doctoral programmes in their activities. At present only very few national agencies address doctoral education as part of their core activities. These include, in particular, the French national evaluation agency (AERES) that exceptionally in Europe also has responsibility for the evaluation of university based research activities and specifically includes a strand focused on the evaluation of doctoral schools. However, other initiatives are being developed, for example, in Hungary, where considerable effort is going into developing a system, including an online database, for the evaluation and accreditation of doctoral schools, or in Germany where one state (Lower Saxony) has already introduced legislation setting out guidelines for the prior accreditation of new doctoral programmes. Other countries have traditionally taken different approaches. In the UK, the structuring of doctoral education at institutional level is one of the elements that is considered in the QAA's programme of institutional audits while in other countries the evaluation of doctoral education is linked to the funding of the specific doctoral programmes and thus often the responsibility of research bodies. However, this is a rapidly changing area and one that requires further examination and analysis.

Conclusions

Developing a European architecture for quality assurance in which a diversity of national agencies using different procedures can co-exist by using the same standards and guidelines for their work and where institutions are able to develop their own distinctive quality culture through internal quality processes and mechanisms that make sense in terms of their specific missions and goals have been one of the achievements of the first decade of the Bologna reform. The challenges in the future will be to consolidate and further develop a European Higher Education Area that combines diversity across – and within – 46 countries while adhering to unifying principles and values, and to set these common "standards" in such a way that they do not stifle diversity, innovative practices and creativity.

The growing stress on indicators, however, may overshadow the importance of keeping a balance between accountability and improvement, quality measurement and quality assurance, and between what needs to be done internally (at the level of institutions) and externally (by governmental or quasi-governmental agencies). It would be unfortunate if the European quality framework that has been agreed were undermined by such a development.

The success of Bologna has hinged on the involvement of all actors, including students and institutions, in policy discussions. This modus operandi at the European level must continue and be strengthened at the national and institutional levels in order to ensure future successes. Thus, one of the on-going challenges for the sector is to press for the continuing engagement of all stakeholders in quality assurance developments and for a clarification of the division of labour between governments, institutions and quality assurance agencies, particularly in the changing context brought about by reforms in autonomy and the strategic importance of higher education and research for the construction of Europe.

References

Joint Quality Initiative (JQF). (2004). Shared 'Dublin' Descriptors for Short Cycle, First Cycle, Second Cycle and Third Cycle Awards. A report from a Joint Quality Initiative informal group. Retrieved October 18, 2004 from http://www.jointquality.nl/

Communication from the Commission to the Council and the European Parliament. (2006). Delivering on the modernisation agenda for universities: Education, Research and

Innovation, Brussels: Commission of the European Communities.

Sursock, A., & Smidt, H. (2010). Trends 2010: A decade of change in European Higher Education, Brussels: EUA.

European University Association (EUA). (2005). Bologna Seminar on Doctoral Programmes for the European Knowledge society: Conclusions and Recommendations, Salzburg: EUA.

EUA (2009). Collaborative Doctoral Education: University-Industry Partnerships for Enhancing Knowledge Exchange (DOC-CAREERS project by: Lidia Borrell-Damian). EUA: Brussels.

EUA (2006). Quality Culture in European Universities: A Bottom-Up Approach, Report on the Three Rounds of the Quality Culture Project 2002-2006, Brussels: EUA.

Davies, H. (2009). Survey of Master Degrees in Europe, Brussels: EUA.

Recent reform in university education and its implications for student development in China

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1. Context: why reform?

With the rapid development of Chinese higher education,[1] together with China's economic reform and social change in recent years, many issues have emerged in university education, especially in the curriculum[2], and its implications for student development. Although higher education in China today is meeting more needs of society than ever before, there are concerns about the adequacy, relevance and quality of its education for students as well as for the state, society, the market and academia. As this paper aims to address the relationship between university education reform and student development, focus will be put on those concerns about this relationship.

1.1 Narrow scope of student majors and curricula

Due to the top-down reorganization of higher learning institutions in 1952, student majors and curricula became very narrowly defined according to the job distribution in the socialist reconstruction. Although they have been gradually broadened every few years since the 1980s, compared with the rapid development of China's economy, science and technology as well as society, they still lag. Student majors are more focused on basic and traditional

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[1] There are about 2,000 higher learning institutions, among which 640 are private, and 20 million students, among whom 3.93 million are private, in China today (see Sun, 2009).

[2] The term "curriculum" here is defined in a broad sense, indicating the whole process of curriculum design, material development, teaching, student learning, assessment and evaluation.

disciplines than applied, newly emerged and interdisciplinary ones. With regard to master's students, the education model is rather uniform, focusing more on academic training than applied fields. The school time for master's degrees is too long (usually 3 years), and that for doctoral students is too short (usually 3 years as well). The knowledge base of doctoral students is neither broad nor in-depth enough to make creative innovations.

According to one survey conducted in 2006, 30.1% of the doctoral students enrolled in 2004 applied for the program out of non-academic motivations (Research Team on Chinese Degree and Graduate Education Development Report, 2006). From 1995 to 2006, of all the graduates with a doctoral degree, only 65.5% were teaching and doing research in higher learning institutions. More and more graduates were working in non-academic fields, from 4.9% in 1995 to 21.1% in 2006. This means that more practical majors and courses should be provided for students.

In another study conducted in 2009, 72% of the master's students and 77.3% of doctoral students remained in the fields of study of their previous degrees (Zhang, 2009). However, in the three years of schooling, they took, on average, only one interdisciplinary course. Of the master's students in humanities and social sciences 44.2% took three interdisciplinary courses, but 31.6% of the master's students and 35.1% doctoral students in natural sciences never took any. It is obvious that more interdisciplinary fields and courses need to be created to meet the needs of China's development in all walks of life.

1.2 Insufficient choice of majors and courses

Although almost all universities claim that students can change their major after enrolment, few provide easy access for this. It usually takes a very complicated and time-consuming procedure for a student to change his or her major. According to one study conducted in 2005, over 40% of the undergraduate students thought about changing their majors, but only about 5% managed to do so (Chen & Wang, 2006). The study found that 43.6% of the undergraduate students thought that the time to choose their major should be delayed to the end of the second year. Faculty, 85%, and students, 77.4%, advocate a full credit system, so that schooling time could become more flexible according to students' learning progress.[3]

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[3] Most of student majors in China are still fixed entities, with fixed courses, faculty, office management and equipment. They are not composed of related courses accounting for credits. The schooling system is called the "school year plus credit" system.

In general, there is not enough choice for courses on the part of the students, and most of the courses are compulsory. According to one study conducted in 2005, of all the 35 credits required for master's students, which accounted for about 15 courses, only 2 were electives (Luo, 2005). For the humanities' students, only about 40% took 5 or more electives. Compulsory courses required by the state government such as politics and foreign languages took about one quarter to one sixth of the required total. In the survey, 80% of the master's degree supervisors in humanities believed that these courses were unnecessary for students. It was found that although students took many courses on foreign languages their capacity to use the languages is rather poor. In the survey, 90% of the humanities' supervisors and 59.1% of engineering supervisors agreed that foreign language courses on student disciplinary subject areas should be offered to replace the generic ones. In addition to politics and foreign languages, almost all students are also required to take compulsory courses in computing and physical education: these occupy more of students' valuable time in their schooling, and prevent them from choosing more elective courses based on their own interests and needs.

Even in graduate education, not enough training has been provided to students on problem identification and problem solving. According to one survey conducted in 2008, only 64.7% of master's students took a course on research methods, and no more than 55.8% took a course on the latest developments in their fields (Luo & Xie, 2008). Over 42% of the master's students in natural sciences took no courses on research methods, and 66.7% of the doctoral students took no courses on the latest developments in their fields (Luo, 2005). Over half of the graduate students in the humanities believed that they lacked knowledge in philosophy. Although 62% of the master's students and 58.7% of the doctoral students did not have any working experience before they came to the program, there were insufficient courses on developing their capacity for practical use or linking their academic knowledge with issues of daily life.

In general, the organization of courses for graduate education is not closely related to student's research topics let alone catering for individual differences. Master's students usually take uniform courses in the first year, participate in their supervisor's research projects in the second year, and start their own thesis research as late as the third year. In almost all universities, very few courses are offered specially to doctoral students alone, due to lack of students' time, and lack of freedom and capacity for supervisors to offer the courses (Research Team on Chinese Degree and Graduate Education Development Report, 2006, p.72).

The main help that graduate students can get in their learning is through interaction with their supervisor. However, due to rapid expansion of graduate education in China, the ratio of supervisors to doctoral students has decreased from 1:3 in 2000 to 1:5 in 2003 nationally, and two-thirds of doctoral supervisors also supervise master's students (National Office of Chinese Association of Political Consultation, 2004). According to a survey of 990 doctoral students from 97 higher education institutions and 20 research institutes, the ratio of supervisors to graduate students in 2006 was 1:1; of the supervisors, 16.8% were responsible for over 30 graduate students (Research Team on Chinese Degree and Graduate Education Development Report, 2006, p.72). To make matters worse, 22.7% doctoral students rarely, and 15.3% never, had an opportunity to attend academic conferences. Only 0.6% of the doctoral students attended an international conference abroad in their 3 years of study.

1.3 Concerns for quality of students

In addition to insufficient choice of courses for students, the quality of the courses is also a concern. As a result of the above problems, among others, student quality has become a focus of attention for both government and universities. More specifically, for undergraduates, the capacity to find their own academic interest and to lay a good foundation for their future development is a major concern. For master's students, the capacity for hands-on practice becomes the focus, while theoretically-oriented education to prepare students for doctoral degree study calls for more thorough reform and flexible arrangement. For doctoral students, the capacity for innovation and problem solving needs to be emphasized (Luo, 2005).

Another big concern is caused by the current trend of "internationalization" of higher education in the world. Due to the strong pull and financial support of some Western universities, many young talented students leave China for further study abroad. More and more high school graduates go to foreign countries such as the US, UK, Australia, New Zealand and Singapore as well as districts like Hong Kong and Macau for their undergraduate study. The first choice of the best undergraduates from China's first-class universities is graduate study in the best Western universities. Many master's graduates also opt to go to foreign countries for doctoral programs. According to one study, in 2006, of all the 45,596 doctoral degrees conferred in the US, 4,774 came from China (including those from Hong Kong, but not from Taiwan, which took 10.5% of the total) (Research Team on Chinese Doctoral Students Quality Analysis, 2010, p.48). As a result, Chinese universities are losing their best young talents as a

resource pool for their training of top creative students.

Of course, different kinds of universities with different objectives and standards of training their students have different priorities in their concerns and foci of attention. For example, higher vocational education needs more practical activities and field work; research-oriented education requires more laboratory work and systematic training on research design and implementation; teacher education asks for a more holistic approach through self-reflection and learning-by-doing in a supportive community of practice, to name only a few. The above summary of concerns for different levels of education (undergraduate, master, doctoral) is only a simplistic picture for the sake of easy analysis.

2. Strategies: how to reform?

2.1 Reform of the training model

In order to meet the changing demands of China's socioeconomic reform, the scope of student major courses has been broadened to a large extent. In 1997, the Ministry of Education (MOE) issued a new list of majors, which reduced the 654 second-level majors to 381, while the first-level majors increased from 72 to 88 (Xie, 2003, p.182). The new majors have allowed students to acquire a wider range of knowledge and skills in order to adapt to the development of disciplines and workplaces. Newly emerged fields of study have been added to the second-level majors such as environmental science and engineering, bio-medical engineering, and binocular engineering.

With the initiation of MOE's Top Talents Training Program in Basic Sciences, some interdisciplinary majors have been established in order to train creative talents for cutting-edge research. In Peking University, for example, majors such as ancient biology, politics-economics-philosophy, and the history of foreign languages have been set up in 2009. Tutors and students in the Yuanpei Program of Peking University (named after the famous president of the university, an historian) have helped to set up such majors, with its interdisciplinary resources and unique model of management.

The Yuanpei Program was established in 2001 with its mission "to produce talents with a broad base of basic knowledge, good humanistic quality, mastery of scientific research methods, capacity for self-study and hands-on activities, a strong sense of innovation and social adaptability". One of its main objectives is to provide high quality students for graduate study, and the original plan was to train students in a cycle of 10 years for academic talents. As the program developed, this ambitious plan was modified to a more practical and diversified

output, with the majority of students going on to graduate study, while others become leading figures in their workplaces.

There are 5 reform strategies within the Yuanpei Program.

1) Students are divided into two broad learning areas, humanities and natural sciences, in the first one and a half years.
2) They can choose their majors and courses based on their interest and capacity as well as the provision of academic disciplines and the teaching plans of the university.
3) The period of study is flexible ranging from 3 to 6 years depending on the student's own progress.
4) Students can choose a tutor, who is appointed by the university to provide personal guidance .
5) Students from different disciplines live together in the same dormitory in order to promote interdisciplinary exchange of ideas.

Established in 2001 with fewer than 100 students, the Yuanpei Program became Yuanpei College in 2008, with increasing student enrolment as well as human and financial support from the university. In recent years, the program has won a number of big awards from the government and academic associations for its innovation in higher education. Over 75% of its graduates go on to graduate study, with quite a few entering world-renowned universities like Harvard, Stanford and Yale. Very few students join the work force directly after graduation. Many students have won first-rank prizes in research projects and innovation competitions.

According to a 5-year longitudinal study of the Yuanpei Program from 2001 to 2006, more Yuanpei students (71.3%) thought that their major was in line with their own interest than non-Yuanpei students (54.9%) in 2005 (Chen & Wang, 2006). The percentage in recent years is much higher as the channel of choosing their major is more accessible than before. The majors of the 329 students from Grade 2001 to Grade 2003 were spread over 22 departments and colleges, not clustered on a few "hot" (popular) majors like management, economics and law. Some students whose preliminary choice is a "hot" field even changed to unpopular ones like philosophy and history. At the time of graduation, most of the Yuanpei students found themselves more at ease with making choices in uncertain circumstances, more independent and more creative than their counterparts in the university.

Similar programs to the Yuanpei Program have also been in operation in many research-oriented comprehensive universities like Fudan University,

Nanjing University, Nankai University, Zejiang University and Sun Yat-sen University, to name only a few. In Fudan University, an undergraduate college has been set up to take care of learning and daily life for all students.

The model for graduate education has also been diversified. A number of professional degree programs have been set up since 1991. By 2006, 16 professional programs had been set up, such as masters for business management, engineering, architecture, law, education, clinical medicine, agricultural dissemination, veterinary medicine and public management, as well as doctoral programs for clinical medicine and veterinary medicine (Research Team on Chinese Degree and Graduate Education Development Report, 2006, p.38; Zhang, 2009). Some universities such as Peking University, Beijing Normal University, and China Central University of Science and Technology have started to experiment on an Ed.D program since 2003, enrolling adult, in-service students who come to the university at intervals. These programs are more pragmatic in their curricula, requiring students to work on issues from their workplaces, rather than purely academic ones. Resources of enterprises are tapped into by the university, and professors work hand in hand with professionals in a joint effort to train more practical students (Xie, 2003, pp.246-250).

Accordingly, school years for master's students have been reduced from 3 years to 2 years in these programs as well as in some academically-oriented ones. The students enrolled in the more practical programs should have worked, usually for 3 years, before entering the program. However, due to pressure from the job market, some programs now also enroll students without any working experience in order to delay their entry into employment. As a result, the objective of this kind of program, to train practical manpower, may be thwarted to a certain degree.

In order to attract good students for graduate study as well as improving continuity between undergraduate education and graduate education, many universities have established programs to let undergraduates go directly into graduate study after 4 years without qualifying examinations. Programs linking masters and doctoral degrees have also been implemented to ensure talented students can go into cutting-edge research more directly within a shorter time by reducing the master's program to only 2 years. Though attracting good students to a higher level of learning, this strategy is not without shortcomings. As the students do not have the chance to conduct research for a master's thesis, they encounter bigger challenges while working for their doctoral dissertations. Another drawback is that as most of these students have no working experiences

before they enter the program, they are put in a disadvantaged position in more practical fields like education, management and law, to name only a few.

Offering a free choice of majors for undergraduates has been trialed in some universities. In the Yuanpei Program of Peking University mentioned above, fresh-men and -women are divided into two broad learning areas, humanities and natural sciences; they do not decide on their majors until the end of the second year. In the first one and half years, they take mostly courses on general education and learning area platform courses in order to understand the academic disciplines at large before identifying their individual interests and capacity.

2.2 Reform in curriculum and instruction

Almost all universities, especially research oriented comprehensive universities, have been offering general education courses for undergraduates in order for them to acquire a broader basis of knowledge. In Peking University, 5 areas of academic disciplines are defined for general education courses: mathematics and natural sciences, social sciences, philosophy and psychology, history, and languages-literature-arts. Students are required to choose 16 credits in four areas apart from their own disciplinary area. According to a survey conducted in 2005, 84.5% of the students thought that general education courses had expanded their knowledge scope, 74.5% believed that the courses had broadened their ways of thinking, and 65.6% agreed that the courses were helpful for them to acquire knowledge outside their own field (Chen & Wang, 2006, p.67). However, due to a lack of accurate understanding of general education and low motivation to offer this kind of course on the part of the faculty, the quality of the courses leaves large room for improvement.

In addition to general education courses, programs like the Yuanpei Program of Peking University have also offered a kind of platform course for its students. Students of natural sciences and humanities share certain platform courses, such as mathematics and Chinese language (with varying degree of difficulties), while taking different ones, such as ancient Chinese language, academic research protocols and writing for the humanities students, and physics, chemistry and biology for the science students. Students take these courses in the first one and half years before deciding on and entering their major. They are also given more freedom than their counterparts in choosing courses in any departments, under the guidance of their tutor, in order to discover their potential and interest.

Some universities like Zhejiang University have set up a research-centered training model for its graduate students, offering students courses on research

methodology, problem solving skills, and student research topics. In order to help students understand research more thoroughly, some institutions ask students to join a certain number of research projects for a fixed length of time, *e.g.* at least one year. In the School of Education, Peking University, students are required to attend at least 9 academic forums in order to get one credit for their study record, in addition to more than one year of research experiences.

International collaboration in curriculum and instruction has also been operating in recent years. Courses from advanced foreign countries like the US and UK have been shared with Chinese students on the internet through advanced technology. Joint efforts in developing cross-cultural and international courses are also underway. Sponsored by MOE and some international organizations, such as the World Bank, many high quality English textbooks have been translated into Chinese and used by faculty and students.

To improve the quality of university education, teaching methods are gradually becoming more participatory, student-sensitive and practical. In addition to traditional lectures, faculty members are using more and more diversified methods such as seminars, discussion groups, experiments, case studies and academic forums. Advanced technology like Power Point and multimedia equipment are increasingly employed in classroom teaching and learning. Students are encouraged to do more self-study and internship in workplaces. Summer schools have been added to the university calendar since 1998, with credits counted in the students' record (Zhang, 2009). In the past few years, MOE has been sponsoring a graduate student summer school, with one university hosting one discipline each year. Well-known scholars of the discipline are invited to the university to teach graduate student representatives from all over China.

In order to improve doctoral students' capacity to do research, those students in research-centered universities are required to publish a number of articles (usually 2) in the leading journals of their fields before dissertation defense. This requirement has enhanced students' sense of urgency for publication, and enlarged the number of publications for the university in the heated nationwide competition for academic reputation. However, this strategy has also hindered students conducting long-term, systematic and in-depth research. Some students are keen on easier and shorter-term projects, and seek less influential journals for publication, thus decreasing perceptions of the quality of their research.

In recent years, quite a few projects have been set up by MOE and local educational authorities to improve teaching materials for university education.

A special fund has been set aside to organize experts to develop high quality materials. MOE has initiated a project called Excellent Courses by selecting excellent courses from all universities. These courses get an award from MOE with financial support before being recorded to the internet to be disseminated nationwide.

In order to ensure the quality of education, a systematic evaluation of teaching and learning quality of the university has been conducted by MOE once every 5 years since 2003. Although the evaluation has helped the university sort out its achievements and problems, there are a lot of complaints from faculty and staff, due to the heavy workload of preparing materials and high-risk pressure.

Evaluation of graduate education programs started from 1994, and those programs which are not up to the standard have been dismissed by the government (Xie, 2003, p.101). Since 1999, prizes for the 100 best doctoral student dissertations have been elected annually nationwide; in some institutions, those colleges and departments whose students win such prizes will be allocated more doctoral student places in the following year (2 slots for one). Since 2000, the theses of graduate students have been randomly assessed by MOE for their quality.

2.3 Inter-institutional reform

In order to make the best use of resources and become more competitive in name, if not in substance, many universities have been forming alliances in their education in recent years. On October 9, 2009, at the 7th conference for the first 9 universities in the 985 Program,[4] a 9 University Alliance was established (C9 for short). The universities involved are Peking University, Qinghua University, Zhejiang University, Fudan University, Shanghai Jiao Tong University, Nanjing University, University of Science and Technology of China, Harbin Institute of Technology, and Xian Jiao Tong University. The 9 universities signed a memorandum on collaboration and exchange of talents among the first-class universities, with the purpose of producing top talents in China and eventually in the world.

According to the memorandum, the C9 will administer the following 10 new measures:

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[4] This program was initiated by MOE to promote a number of key universities to become world class speedily. The 9 universities named here were the first group to have received financial support from MOE for this purpose. More universities joined the group in later years.

1) Mutually acknowledge credits and scores of their undergraduate students
2) Accept visiting graduate students for more than 6 months and acknowledge their credits
3) Jointly organize summer schools
4) Establish linkages with US Ivy League and Australian G8 Universities
5) Develop textbooks and other learning materials together
6) Publicize C9's core excellent courses, and make use of their long distant learning platform
7) Alternate in hosting an annual meeting on reform in the areas of student enrolment, degree conferring, schooling recording and training mechanisms
8) Train young faculty members by using the joint facilities of the C9
9) Establish a network to review doctoral student dissertations by professors of the other universities in order to improve the quality of doctoral students
10) Organize joint field work, internship, research design, social investigation, and social practice mainly for undergraduate students.

According to some scholars, this new alliance will produce positive impacts on student development, but not without negative implications (Science Time, 2009). For one thing, the opening of all courses in the 9 universities will encourage more interdisciplinary learning and research among students. Free choice of courses among the C9 will force faculty to improve their teaching quality, as students may choose to transfer from less qualified courses to better ones. As each university encourages its students to proceed to higher learning in the other universities, the phenomenon of inbreeding may be reduced to a certain degree.

But while acknowledging its positive impact, some scholars think that the C9 is in fact an alliance of mutual interests, which will make the strong stronger and the weak weaker. Having monopolized most of the resources in China's higher education, the 9 universities, within such an alliance as the C9, may support each other in seeking more resources from the government. As a result, second-class universities and local universities, especially those in the remote and poor western part of China, may be further deprived of chances for equity.

Although the alliance seems to be an activity creating first-class university stars, tacitly supported by the government, others argue that it is more a non-governmental action. The universities take initiatives of their own in

making the best use of each other's strengths, which shows their increasing sense of independence and self-alliance. It is advocated that more alliances can be organized bottom-up by region, level, discipline, training model, and even by country (Science Time, 2009).

3. Future Prospect: What Next?

In spite of the reform strategies mentioned above, Chinese universities still face many challenges in their education for student development. One area for improvement is the relatively low standard for student graduation. As China's practice is "tight in and loose out", students enter the university after a very competitive national examination, and the graduation rate is very high, close to 100%. There is lack of rigorous quality checking and dismissal of students in the process of their learning. Take doctoral student learning for example, although there are at least 6 hurdles for students on their way to complete their degree (course work, qualifying exams, research proposal, preliminary oral defense, final thesis defense, publications), each hurdle seems undemanding. In order to ensure their students find a job after graduation, the academic committee is usually quite willing to let them progress. Protecting the "face" of the supervisor is also an influential factor in this easy-going process.

Although more practical degrees have been set up to train more practical students, there is still a tendency to educate all students according to academic standards and methods. This is mainly due to lack of thorough understanding of different levels and kinds of education for different students for different labor markets, insufficient capacity of the faculty in pragmatic fields, and not enough resources and equipment for hands-on activities. An alternatively danger, in overemphasizing practical ways of training, may lead to an uncalculated lowering of education quality for students.

In spite of the many positive impacts of programs like the Yuanpei Program on student development mentioned above, the students have suffered a lot from the two-track system, that is, the Yuanpei Program has been running in parallel to the traditional model in the departments and colleges. As a result, students encounter conflicts of time in taking courses and exams, as well as discontinuity of courses in their chosen departments and colleges. As departments and colleges have not adopted the model of general education, many basic courses have already been completed by the time that Yuanpei students enter the departments and colleges. Since Yuanpei students spend more time on interdisciplinary courses and platform courses, their average point scores are

usually not as high as their counterparts in the departments and colleges. This has put them at a disadvantage in applying for graduate study. With limited resources, some departments and colleges do not take Yuanpei students as seriously as their own students. Sometimes, Yuanpei students feel neglected and discriminated against by the departments and colleges.

Neither has the tutor system produced the expected effect. Although the program increased the number of tutors from over 10 in 2001 to over 30 in 2009, they are still too few to meet the students individually. Besides, the tutors are all famous professors, often too busy to talk with students at length. In recent years, younger faculty members and retired professors have been added to the list of tutors, but the number is still not enough for the needs of the students.

The mixed dormitory arrangement has proved to be a good idea, but students of different disciplines rarely have chances to talk in depth. The fresh-men and -women are too busy with their own courses, or they know too little about their own disciplines to talk in depth about it with students of other disciplines.

For graduate education, although a lot of reform strategies have been underway, there are still concerns about the relevance and quality of its education. More specially, more diversified models of training of students are needed to meet the varying needs of job markets in addition to academia. More flexible schooling time and time accorded to teaching and learning management should be employed. Better quality of education provision should be ensured both in contents and methods, by way of more individualized guidance by supervisors, group work among students, and closer linkages between study and work. A more rigorous procedure of screening students during the process of graduate education is also an important concern.

All in all, Chinese universities are facing many challenges and areas for improvement in their efforts to provide good quality education for different groups of students with varying needs and interests. Although a lot of reform strategies have been implemented, there is still a long way to go. Any reform in university education requires synchronized action by all the forces of life. Fortunately, China is now on the way of becoming a world power, and there are more opportunities and potential for the university to tap into. The university in China needs to seek the support of the government and society, while venturing into its own innovations for student development.

References

Chen, X., & Wang, Z. (2006). An Inquiry into General Education Model for University Undergraduate Students: A Case Study on Yuanpei Program of Peking University. In D. Gang (Ed.), *China's Education: Research & Review* (10th Issue). Beijing: Education Research Press.

Luo, Y. (2005). Reflections on the Reform of China's Curriculum System. *Journal of Higher Education*, *26*, (11).

Luo, Y., & Xie, A. (2008). Relevance and Integration: Theoretical Reflection on the Construction of Doctoral Student Individual Curriculum. *Research on Chinese Higher Education*, 7th Issue.

National Office of Chinese Association of Political Consultation. (2004). Importance Should Be Attached to Issues Caused by the Expansion of Doctoral Students (July, 22, 2004). *Special Newspaper on Political Consultation Information*.

Research Team on Chinese Degree and Graduate Education Development Report (2006). *Report on the Development of Academic Degrees and Graduate Education in China*. Beijing: Higher Education Press.

Research Team on Chinese Doctoral Students Quality Analysis. (2010). *Report on Chinese Doctoral Students Quality*. Beijing: Peking University Press.

Science Time. (2009). The Strategic Implications of C9 Can Not Be Underestimated (October 20, 2009). *Science Time Newspaper*.

Shen, W. (2009). Diversity, Internalization and Structuration: Transformation of Current Doctoral Student Education and Its Policy Implications (Unpublished article). Beijing: Peking University.

Sun, R. (2009). Conference Summary of Chinese Higher Education in Changsha (Unpublished article). Beijing: Peking University.

Xie, G. (2003). *Chinese Higher Education in the 20th Century: Volume on Degree System and Graduate Education*. Beijing: Higher Education Press.

Zhang, G. (2009). Policy Analysis on China's Graduate Curriculum (Unpublished article). Beijing: Center for Curriculum and Textbook Development, Ministry of Education.

Special Speech

Pursuing Excellence in Graduate Education

Masuo Aizawa
Executive Member, Council for Science and Technology Policy (CSTP)
Cabinet Office, Japan

Prime Minister Hatoyama's Address in UN

Japan aims at reducing GHG emissions by 25% by 2020 if compared to the 1990 level, assuming the agreement of the eager reduction target by all major countries.

Haotyama Initiative
Support to developing counties for solving climate change

Guideline for FY2010 S&T Budget Request

Green Innovation

Green Technologies
- Deploy developed green technologies
- R&D of innovative green technologies
- Challenge new green technologies
- Financial support to developing countries

Social Innovation
- Life style changes "MOTTAINAI"
- Revitalize agriculture and forestry
- Create new green industries

Despite the challenges, every nation intends to thrive for prosperity

- In the first decade of the 21st century, we have faced the global challenges of economic crisis, climate warming, pandemic infectious diseases, and others, which threaten sustainability.
- Japan also suffers from the national challenges of ageing, population decline, constraints of natural resources and foods, natural disasters, and others, which threaten our prosperity with safety and security.
- Despite these challenges, every nation intends to leap-up forward for achieving sustained prosperity with safety and security in the drastically changing world.

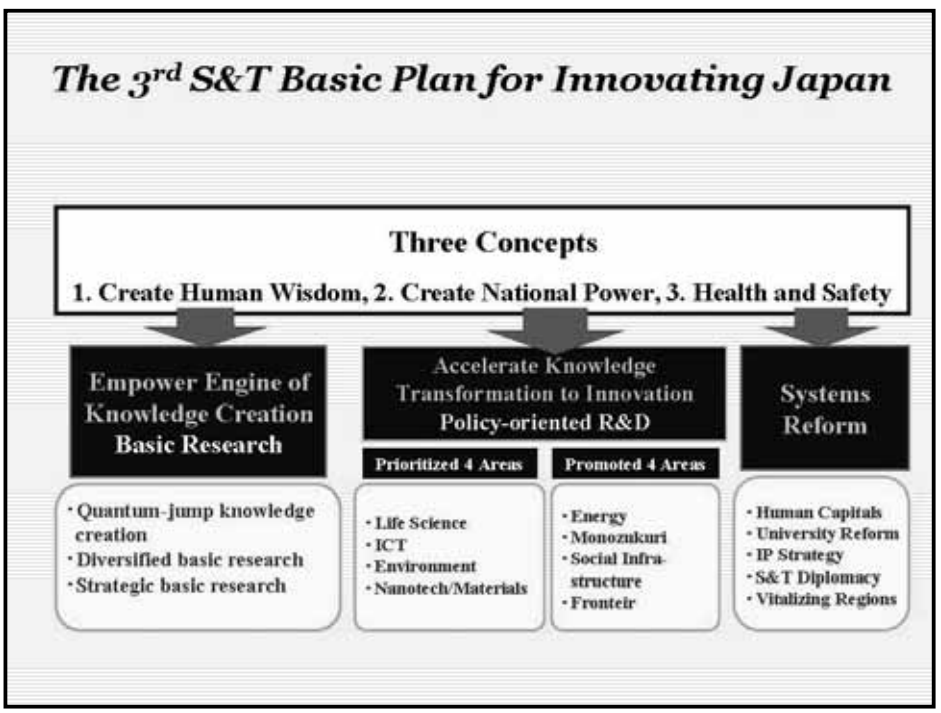
Fiercer in international competitiveness

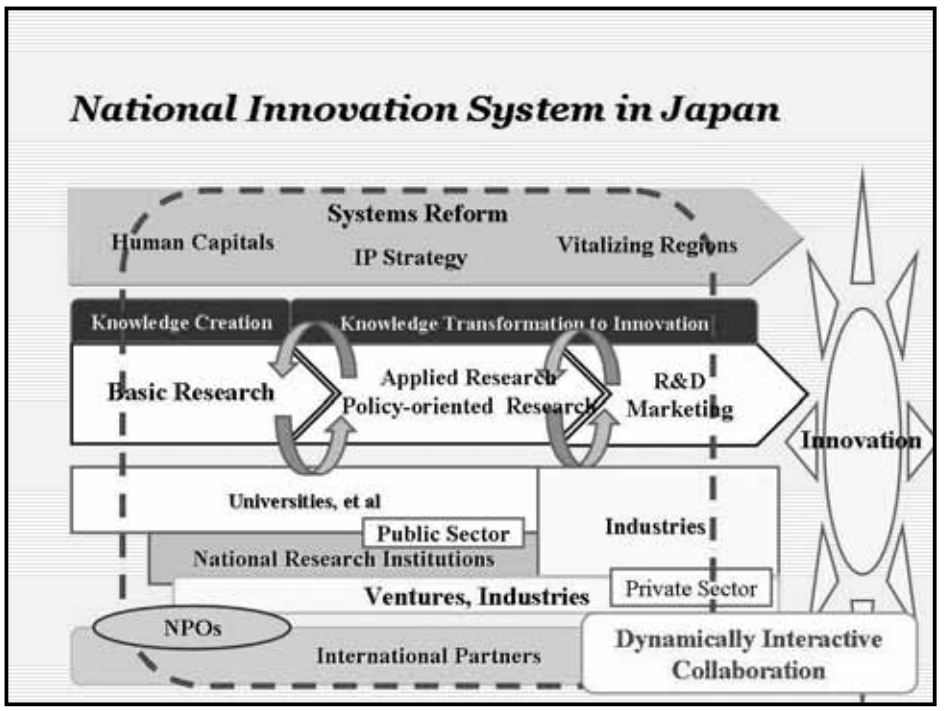
- *Due to increasing economic growth of China and India, and others, the global structure is geologically multi-polarized, which leads to an Era of Asia.*
- *The nations of these rapidly growing mega-countries are also becoming internationally competitive in S&T and human capitals.*
- *Consequently, it is getting fiercer to take international leadership than ever.*
- *Innovation is key to thrive for the future with challenging the global and national issues in such a drastically changing world.*

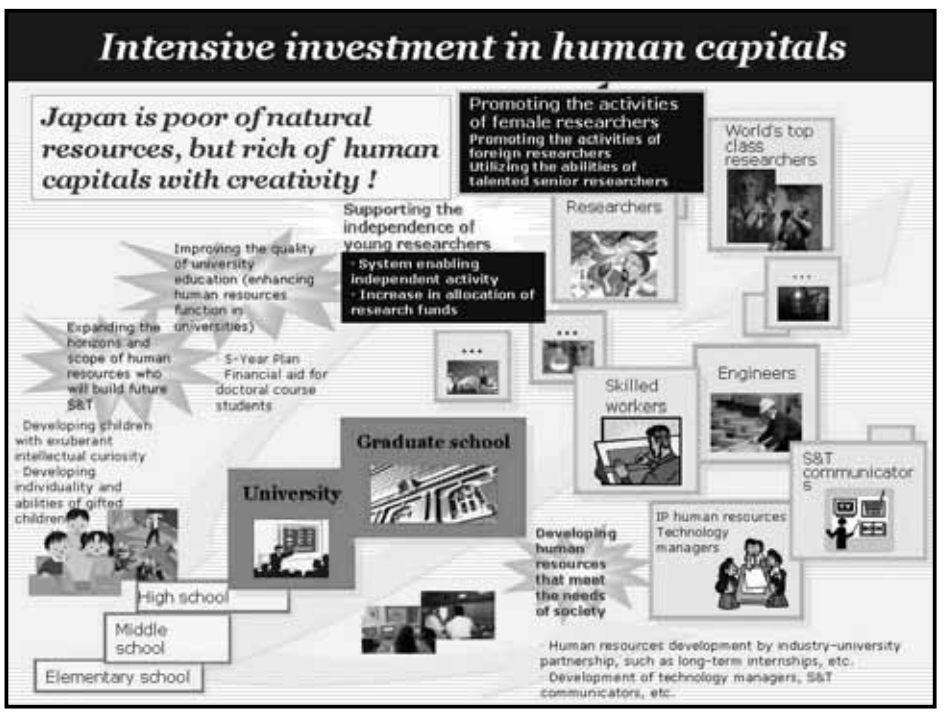
Urged to strengthen international leadership and intellectual presence

- *Japan has been internationally competitive in science and scientists.*
  - *Nobel Prize*
  - *Highly evaluated scientists*
- *Breakthroughs have consistently been emerged from basic research, which can be transformed to innovation.*
  - *Human iPS cells*
  - *New super-conducting materials*
- *But, we are relatively declining in economic growth.*
- *We must urgently strengthen the international leadership in innovation and intellectual presence.*


Outline
1. Introduction
2. Graduate education in the national strategy on international competitiveness
3. Pursuing excellence in graduate education
4. Globally competitive research universities
5. Conclusion


The 3rd S&T Basic Plan for Innovating Japan
Three Concepts
1. Create Human Wisdom, 2. Create National Power, 3. Health and Safety
Empower Engine of Knowledge Creation Basic Research
Accelerate Knowledge Transformation to Innovation Policy-oriented R&D
Systems Reform
Prioritized 4 Areas
Promoted 4 Areas
・Quantum-jump knowledge creation
・Diversified basic research
・Strategic basic research
・Life Science
・ICT
・Environment
・Nanotech/Materials
・Energy
・Monozukuri
・Social Infra-structure
・Frontier
・Human Capitals
・University Reform
・IP Strategy
・S&T Diplomacy
・Vitalizing Regions


National Innovation System in Japan
Systems Reform
Human Capitals
IP Strategy
Vitalizing Regions
Knowledge Creation
Knowledge Transformation to Innovation
Basic Research
Applied Research
Policy-oriented Research
R&D
Marketing
Innovation
Universities, et al
Public Sector
Industries
National Research Institutions
Ventures, Industries
Private Sector
NPOs
International Partners
Dynamically Interactive Collaboration


Intensive investment in human capitals
Japan is poor of natural resources, but rich of human capitals with creativity !
Promoting the activities of female researchers
Promoting the activities of foreign researchers
Utilizing the abilities of talented senior researchers
World's top class researchers
Researchers
Supporting the independence of young researchers
・System enabling independent activity
・Increase in allocation of research funds
Improving the quality of university education (enhancing human resources function in universities)
Expanding the horizons and scope of human resources who will build future S&T
5-Year Plan
Financial aid for doctoral course students
Developing children with exuberant intellectual curiosity
Developing individuality and abilities of gifted children
Graduate school
University
Skilled workers
Engineers
S&T communicators
IP human resources
Technology managers
Developing human resources that meet the needs of society
High school
Middle school
Elementary school
・Human resources development by industry-university partnership, such as long-term internships, etc.
・Development of technology managers, S&T communicators, etc.

Strengthening graduate education as part of a national strategy

- Graduate education is a vital part of the Japanese higher education system.
  - Doctor degree
  - Master degree
  - Professional master degree
- Graduate education must be strengthened as part of a national strategy in international leadership and intellectual presence.
- The individual graduate school should distinctively state the mission;
  - in education
  - in research.

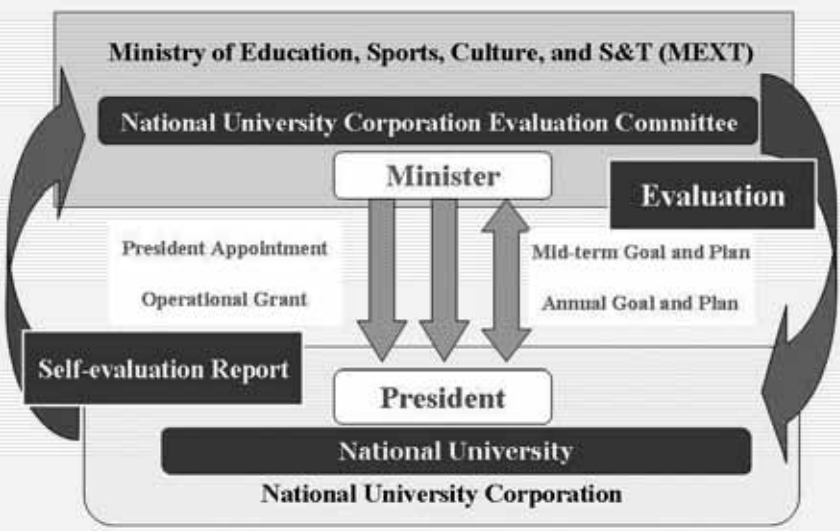
What happened since 2001

- 2001 Structural reform of the government
  MEXT, METI, et al established, CSTP established
  Independent Administrative Agency established
- 2004 National University Corporation started
  Evaluation Committee for National University Corporation established in MEXT
  Professional Graduate University started
- 2006 The 3rd S&T Basic Plan stated issued (-2010)
  The Graduate Education Initiative issued
- 2010 End of the first mid-term for National University Corporation

National university reform for enhancing distinctiveness and competitiveness

- *National University Corporation was established in 2004 for managing the corresponding National University with the President's leadership, being independent from MEXT.*
- *The aim of the reform was to make the individual national university distinctive and competitive.*
- *Educational reforms of under-graduate and graduate schools were strongly requested in the individual national university level.*
- *The PDCA system was implemented in the individual national university and the National University Evaluation Committee of MEXT, linking with NIAD.*

Plan-Do-Check-Act System for National Universities



Outline

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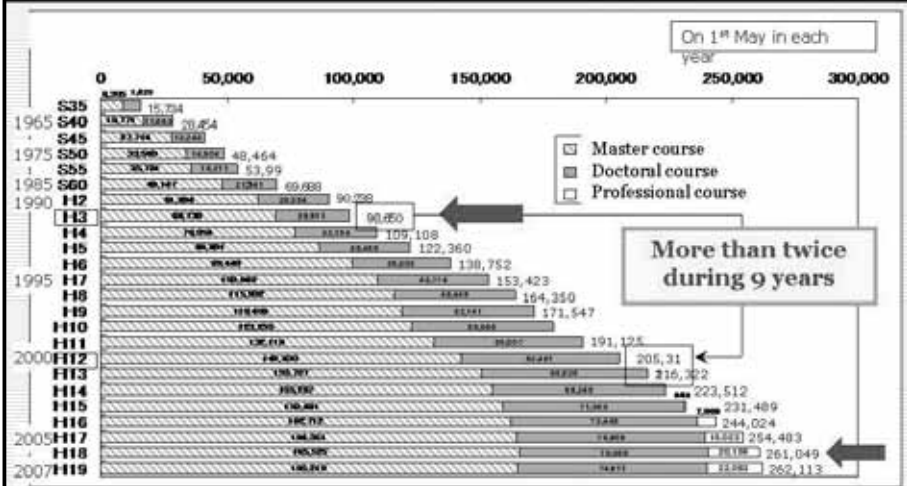
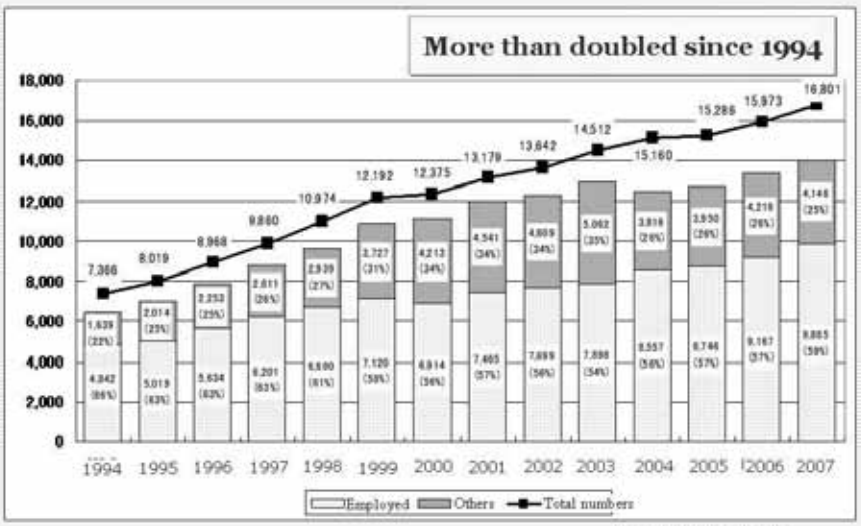
2. *Graduate education in the national strategy on international competitiveness*
3. *Pursuing excellence in graduate education*
4. *Globally competitive research universities*
5. *Conclusion*

Rapid increase in graduate students



By MEXT (2007)

Graduate students completed in the doctor program



By MEXT (2007)

System reform for graduate schools

- *Graduate schools were independently organized from under-graduate schools in research universities.*
- *Both research and education missions were granted to graduate schools, while under-graduate schools were concentrated on education.*
- *Graduate students increased enormously in number since 1990, reaching about 262,000 in total, which consisted of 165,000 for master course, 75,000 for doctor course and 22,000 for professional course in 2007.*
- *In 2007, MEXT started funding to graduate schools for reinforcement of graduate education according to the Graduate Education Initiative.*

Pursuing excellence in graduate education (1)

- *From historical background, graduate students have primarily been educated in the enrolled laboratory under the guidance of advisor professor, although some course works are programmed in the department.*
- *Graduate students are well trained to finish their theses works in advisor's laboratory, which probably prevents them from diversified perspective.*
  - *Takotsubo training ?*
  - *Research assistant to supervisor ?*
- *Time is now ! Individual university must pursue excellence in graduate education and reform the graduate education programs.*

Pursuing excellence in graduate education (2)

- *Individual graduate school must clearly state the aims and graduate education programs for master course, doctor course, and professional graduate course.*
- *Graduate education programs should be improved by strengthening course works and others.*
- *Graduate education programs are requested to attract students from Japan as well as other countries.*
- *Graduate education programs are preferable to delivered in English and accessible by the Open Course Ware (OCW) and others.*
- *International quality assurance should be discussed for graduate education.*

Enhancing student mobility in graduate education

- *Students are encouraged to join a graduate school which is different from the undergraduate school.*
- *Students are encouraged to go abroad for short term study in other universities.*
- *Individual universities are urged to support the student mobility in any level.*
- *Individual universities are requested to strengthen international partnership with relevant universities in other countries.*
- *Individual universities are requested to pursue excellence in graduate education for fostering students with critical thinking, creativity and global perspective.*

Graduate Education Initiative

MEXT in 2006 (Council for Central Education)

Outline

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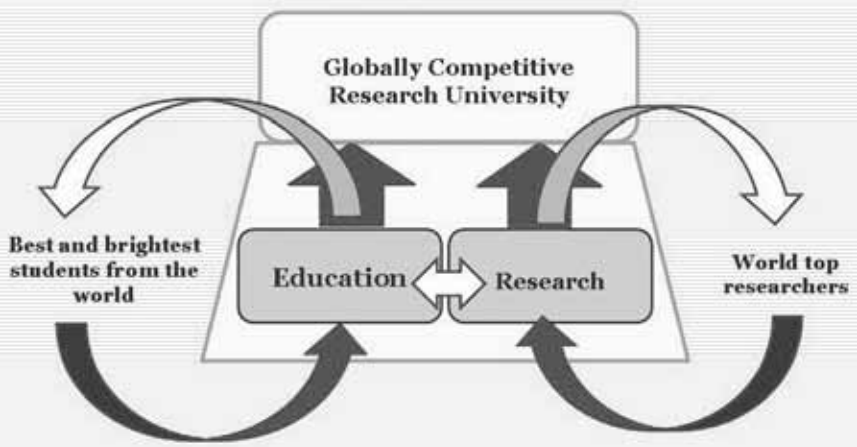
Toward globally competitive research university

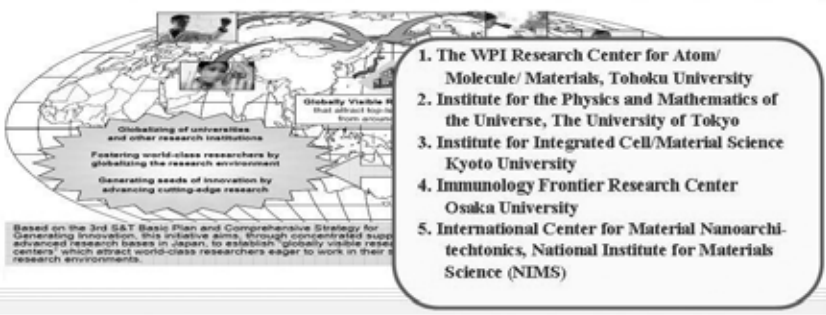


Making research universities globally competitive

- *Research universities can be globally competitive through recruiting world top researchers with elevating research level in harnessing with enhancement of attracting best and brightest students from around the world.*
- *It is essential to open universities to the world for enriching diversities in different ways of thinking, ideas, cultures, genders, and others.*
- *Research universities are strongly requested to challenge the global issues for sustainability through integrating knowledge by international collaboration.*

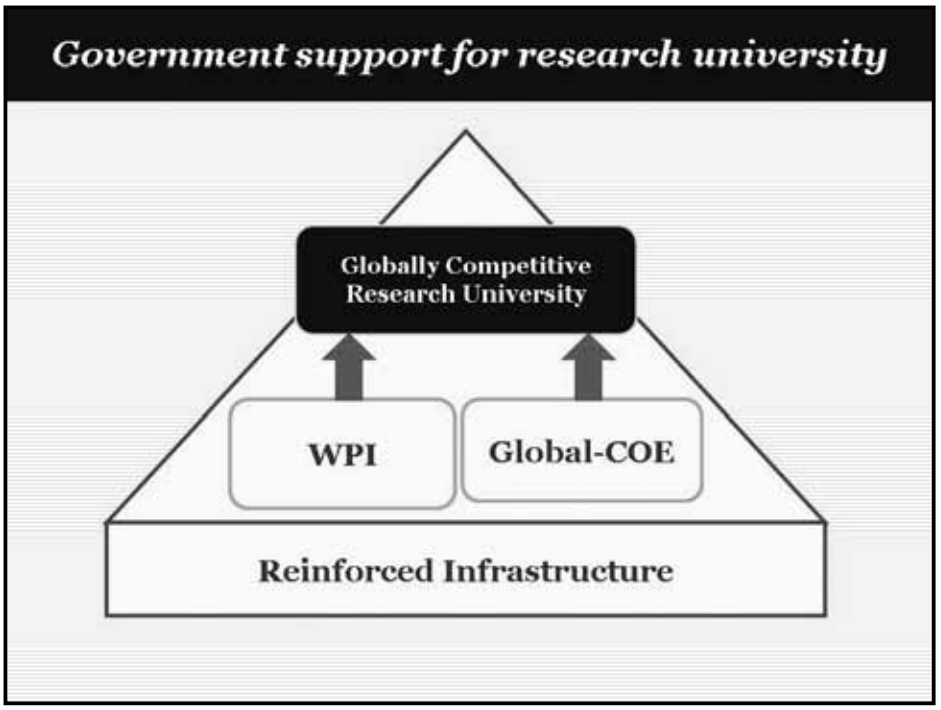
Establishing Global Excellence

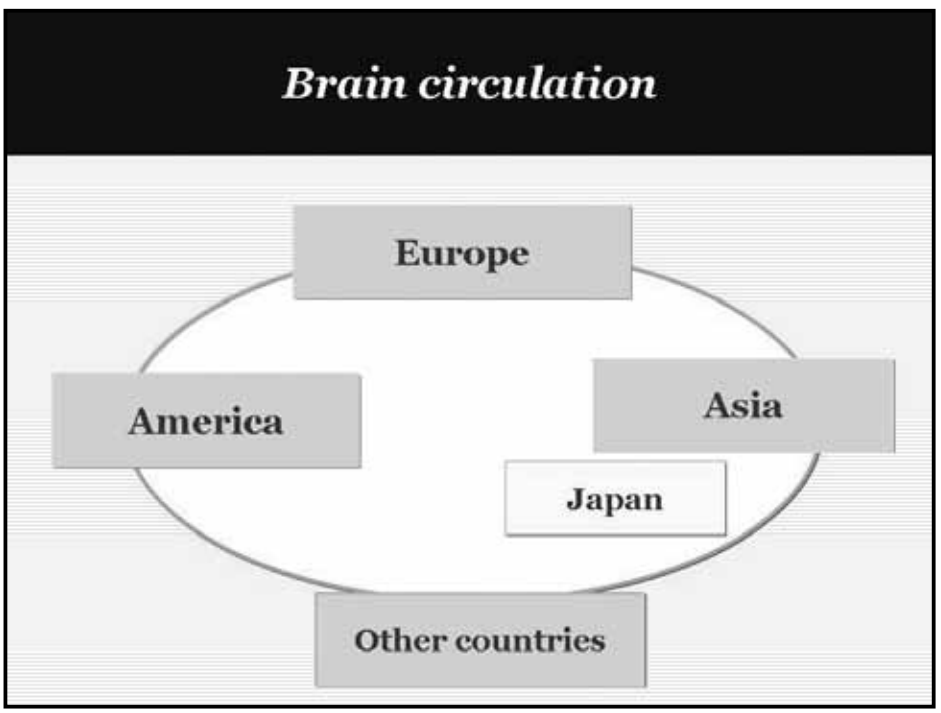
1. World Premier International Research Center (WPI) Initiative



1. The WPI Research Center for Atom/ Molecule/ Materials, Tohoku University
2. Institute for the Physics and Mathematics of the Universe, The University of Tokyo
3. Institute for Integrated Cell/Material Science Kyoto University
4. Immunology Frontier Research Center Osaka University
5. International Center for Material Nanoarchitechtonics, National Institute for Materials Science (NIMS)

2. Global COE Program (Started in 2007)
21st Century COE Program (Started in 2002)


Government support for research university
Globally Competitive Research University
WPI
Global-COE
Reinforced Infrastructure


Brain circulation
Europe
America
Asia
Japan
Other countries

Conclusion

- *Graduate education is a vital part of the Japanese higher education system.*
- *Graduate education must be strengthen through pursuing excellence with global perspective.*
- *Research universities are encouraged to be globally competitive through spiral evolution of recruiting world top researchers and attracting best and brightest students from around the world.*

Conclusion

Polices, practice, and implications concerning graduate education and its quality assurance: from global, regional, national, and institutional perspectives

Futao Huang*

The Research Institute for Higher Education (RIHE) of Hiroshima University organized its first international workshop, entitled "Producing Qualified Graduates and Assuring Education Quality in the Knowledge-based Society: roles and issues of graduate education", as part of the Strategic Research Project on University Reform from November 19-20, 2009. At the workshop, Dr Simon W. Marginson, professor at the Centre for the Study of Higher Education, Melbourne Graduate School of Education, University of Melbourne, Australia, and Dr Ryo Hirasawa, professor emeritus at the University of Tokyo, Japan, provided the two keynote speeches. Ms Lesley Wilson, Secretary General, European University Association, Belgium and Dr Xiangming Chen, professor, Graduate School of Education, Peking University, China, were invited to make another two presentations; and Dr Masuo Aizawa, Executive Member, Council for Science and Technology Policy (CSTP) at the Cabinet Office, Japan contributed a special speech. With participants from different parts of Japan, approximately 50 people attended the workshop.

As indicated in the title, the major theme of the workshop was to deal with the issue of how to produce well-qualified university graduates and how to assure the quality of education especially at the level of graduate education in the knowledge-based society. Based on the presentations and speech, the key points for each of the speakers can be practically identified as follows.

The first keynote speech, given by Dr Marginson, was mainly concerned

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with global movements in research labor and doctoral students. By identifying the three different but interrelated domains of higher education and research practice: the global dimension, the national dimension, and the local dimension, Dr Marginson affirmed that we are in a "glonacal" era of higher education, in which glonacal indicates some combination of global, national and local factors. He emphasized that the main challenge for most higher education systems, except for some research universities and nations, was to contribute to shaping the global dimension. With respect to the creation of global dimension, he illustrated four distinguishable strategies that help to shape the global dimension of higher education in international and comparative perspectives. These are government-driven strategies, institution-driven strategies, jointly-driven strategies, and multiple actor strategies. Against the background of globalization and especially the current process of achieving global dimensions of higher education through various strategies in individual nations, Dr Marginson concluded his argument by suggesting three implications of University rankings that can help to shape the patterns of mobility of talent. Universities should focus on performance and its marketing. Second, higher education systems, and individual research universities, now need to build research capacity at home and improve cooperation with other national research systems. Third, the global competition for mobile talent is now a powerful driver of university and national decision-making. Finally, he posed issues related to the global flow of talent.

Dr Hirasawa presented a case study from Japan that focused on a mission-oriented knowledge system in graduate schools. He began his discussion by pointing out four major issues facing graduate schools in Japan. In order to deal with these issues, Dr Hirasawa identified two aspects that have been adopted by Japan's government: exploration of new science and technology and implementation of mission-oriented research. As mission-oriented research is opposed to traditional, discipline-based research, Dr Hirasawa elaborated the definition of the former and illustrated two striking case studies in Japan related to mission-oriented research. In addition, Dr Hirasawa, by examining several evaluations exercised in the last decades, suggested measures that should be implemented to realize mission-oriented research that is of direct benefit to society.

By providing extensive quantitative data from findings of surveys across European countries, Ms Wilson placed the emphasis of her talk on reform in European higher education on quality assurance and the changing nature of doctoral education in the European continent. In her introduction to the last

decade of reform in European higher education, Ms Wilson looked back on the reform agenda, doctoral education across Europe, and the role of the qualifications frameworks for the European Higher Education Area. Then she made a brief historical sketch of quality assurance in Europe, especially changes occurring since the Bologna Process with the purpose of creating a European framework for quality assurance, and the measures that should be carried out in order to promote quality in doctoral education. According to her analysis, these measures include increased links between the master's degree and the doctorate and the unique nature of doctoral education from the perspective of quality assurance. Ms Wilson concluded her discussion by identifying the achievement that has been made in developing a European architecture for quality assurance, on-going challenges, and the future challenges in further building up a European Higher Education Area that combines diversity across – and within – forty six countries while adhering to unifying principles and values, and setting these common "standards" in such a way that they do not stifle diversity, innovative practices and creativity.

Dr Chen's presentation dealt with recent reform in university education and its implications for student development in China. By illustrating the changing context of China's higher education reform, Dr Chen gave a detailed account of the strategies which have been implemented in Peking University to undertake reform in producing qualified graduates at both first degree and postgraduate levels. Among these, two changes have had significant impacts on the university. They are reform of the training model, typically represented in a totally new educational program: the Yuanpei Program; and reform of the curriculum in terms of its structure and contents, as well as instruction. With regard to future prospects in this regard, Dr Chen argued that, as Chinese universities are facing many challenges and areas for improvement in their efforts to provide good quality education for different groups of students with varying needs and interests, they leave a great deal to be improved at national, institutional and program levels.

The final special speech was delivered by Dr Aizawa on the pursuit of excellence in graduate education based on a case study of Japan. In his introduction, by describing briefly the increasingly competitive world, Dr Aizawa urged that Japan should strengthen its international leadership in innovation and intellectual presence. As for the strategy that should be developed to achieve this, he emphasize that the policy of strengthening graduate education should be part of a national strategy and a vital part of the national education system. Dr Aizawa concluded his speech by making two proposals.

First, Japan's graduate education should be strengthened through pursuing excellence on a global perspective. Second, research universities should be encouraged to be globally competitive through a spiral evolution of recruiting world-ranked top researchers and attracting the best and brightest students from around the world.

Evidently, the theme of the workshop lent itself to examination at diverse levels and to a wide variety of perspectives by the five speakers from their different countries. As a scholar in social politics and higher education, Dr Marginson discussed issues concerning the mobility of researchers and doctoral students at the level of a world perspective so as to provide us with an overview of global trends. The two Japanese speakers: Dr Hirasawa and Dr Aizawa addressed issues relating to quality assurance systems and particularly graduate education, including the doctoral level, from the perspective of policy changes and through typical case studies in Japan. As one of the top administers in the European University Association (EUA), Ms Wilson contributed to the workshop by touching on a wide range of topics with a focus on the changing reforms on structures of quality assurance and doctoral education across Europe at a regional level. In contrast, Dr Chen's presentation was more concerned with changes and reforms on the production of qualified graduates and on curriculum development in a research university at an institutional and program levels.

Through the inspiring presentations and panel discussion, some noticeable implications can be gained, as follows.

- It is important for nations and individual institutions, and especially for research universities, to adopt a global dimension in order to enhance the quality of graduate education and research activities.
- There is an increasing demand for graduate education to be more flexible in the changing world, and more responsive to the demands of industry and society at large.
- The generally-accepted standards or frameworks for quality assurance at a regional level, for example, across the European continent, and the diversifying internal quality assurance mechanisms or structures could co-exist, even when they are concerned with the quality of doctoral education.
- Various factors might contribute to the improvement of quality and excellence of graduate education. However, in some countries, such as Japan and China, national HE reforms and national policy seem to have played a central role in affecting the quality of production of graduates, including doctoral students.

Appendices

Appendix 1: Conference Program

International Workshop on Graduate Education

Date: November 19-20, 2009
Venue: Hiroshima University

Thursday, November 19

12:30 - Registration

*** **Opening Addresses** ***

13:00 - 13:15 Toshimasa Asahara, President, Hiroshima University, Japan
Shinichi Yamamoto, Director & Professor, Research Institute for Higher Education (RIHE), Hiroshima University, Japan

*** **Presentations** ***

MC: Futao Huang, Professor, RIHE, Hiroshima University, Japan

13:15 - 14:15 **Keynote Speech 1**
"Global Movements in Research Labour and Doctoral Students: implications for national systems and universities"
Simon W. Marginson, Professor, Centre for the Study of Higher Education, Melbourne Graduate School of Education, The University of Melbourne, Australia

14:15 - 15:15 **Keynote Speech 2**
"Mission-Oriented Knowledge System in Graduate Schools: how can we ingrain it and assure the quality?"
Ryo Hirasawa, Professor Emeritus, The University of Tokyo, Japan

15:15 - 15:30 Coffee Break

15:30 - 16:15 **Speech 1**
"Higher Education Reform for a Knowledge Society in Europe: diversification, quality and accountability"
Lesley Wilson, Secretary General, European University Association, Belgium

16:15 - 17:00 **Speech 2**
"Recent University Curriculum Reform and its Implications for Student Development in China"
Xiangming Chen, Professor, Graduate School of Education, Peking University, China

17:00 - 17:30 Q & A

Friday, November 20

*** **Special Speech** ***

MC: Shinichi Yamamoto, Director, RIHE, Hiroshima University, Japan

9:30 - 10:30 "Pursuing Excellence in Graduate Education"
Masuo Aizawa, Executive Member, Council for Science and Technology Policy Cabinet Office, Japan / Former President, Tokyo Institute of Technology, Japan

*** **Panel Discussion** ***

"Graduate Education and Producing Qualified Graduates"

10:30 - 12:00 **Panelists:**
Masuo Aizawa
Simon W. Marginson
Ryo Hirasawa
Lesley Wilson
Xiangming Chen

Appendix 2: List of Participants*

OVERSEAS PARTICIPANTS

Invited Experts

Simon W. Marginson	Professor, Centre for the Study of Higher Education, Melbourne Graduate School of Education, The University of Melbourne, Australia
Lesley Wilson	Secretary General, European University Association, Belgium
Xiangming Chen	Professor, Graduate School of Education, Peking University, China

and another 4 overseas participants

JAPANESE PARTICIPANTS

President

Toshimasa Asahara	President, Hiroshima University

Invited Experts

Masuo Aizawa	Executive Member, Council for Science and Technology Policy Cabinet Office／Former President, Tokyo Institute of Technology
Ryo Hirasawa	Professor Emeritus, The University of Tokyo

Research Institute for Higher Education (RIHE)

Shinichi Yamamoto	Director and Professor
Ikuo Kitagaki	Professor
Tsukasa Daizen	Professor
Futao Huang	Professor
Naoyuki Ogata	Professor
Jun Oba	Associate Professor
Masataka Murasawa	Associate Professor
Kazunori Shima	Associate Professor
Satoshi Watanabe	Associate Professor
Hideto Fukudome	Associate Professor
Yumiko Hada	Associate Professor

and another 33 Japanese Participants

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* As of November, 2009

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No. 1: Kaneko, M. (1987). *Enrollment Expansion in Postwar Japan*.
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Higher Education Forum

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Higher Education Forum Vol. 4 (2007).
Higher Education Forum Vol. 5 (2008).
Higher Education Forum Vol. 6 (2009).
Higher Education Forum Vol. 7 (2010).

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