Seventh Annual Strategic Leaders Global Summit

GRADUATE EDUCATION AND THE PROMISES OF TECHNOLOGY

30 September to 2 October, 2013
Central European University
Hungarian Academy of Sciences
Budapest, Hungary

CGS acknowledges ProQuest UMI's generous support of the 2013 Strategic Leaders Global Summit

Location Information

The Summit will be held at the **Hungarian Academy of Sciences**, at Széchenyi István sqr. 9, located just across the park from the Hotel Intercontinental.

Hotel details:
Hotel Intercontinental
Apaczai Csere Janos, 12-14, Budapest
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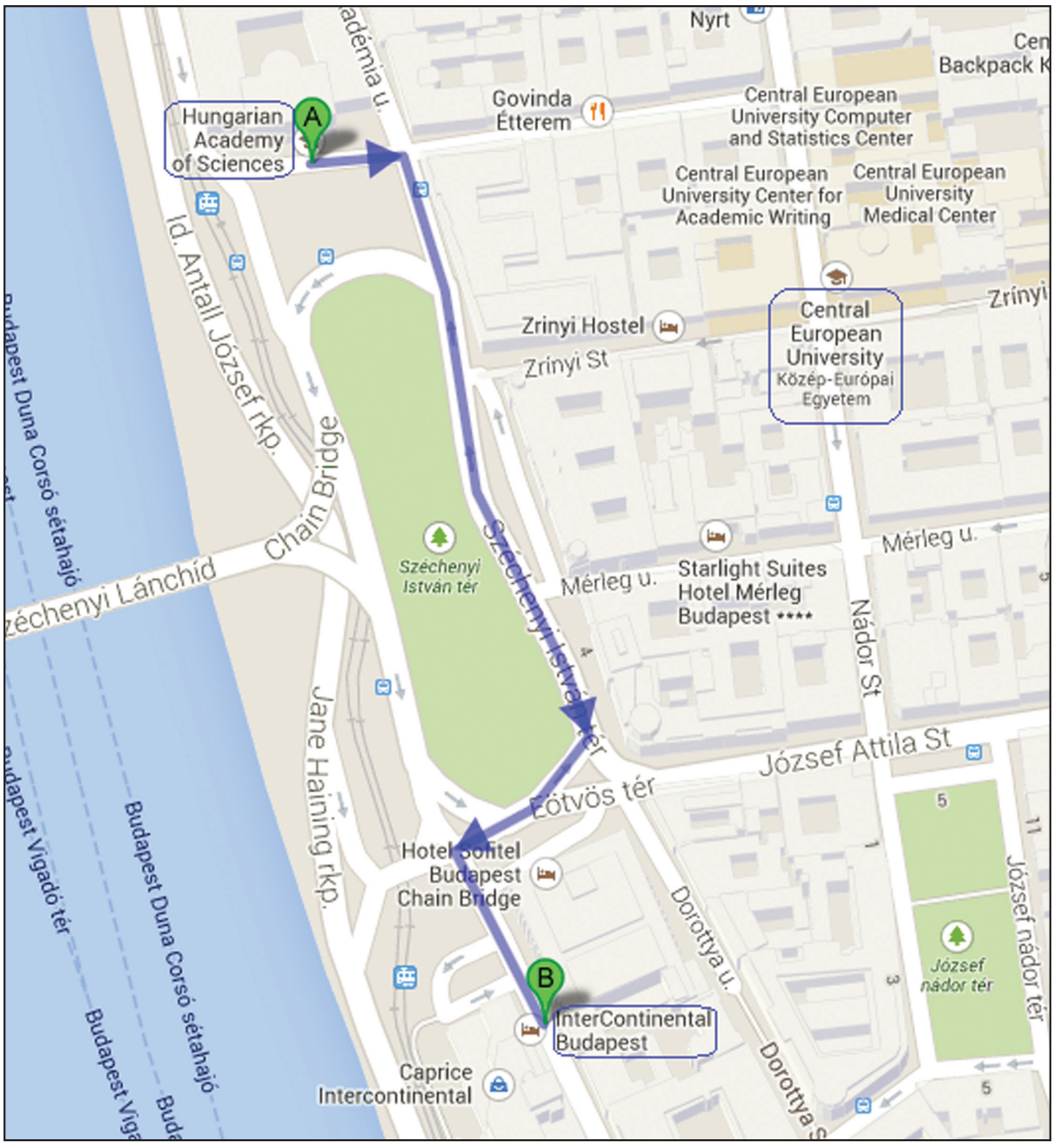

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2013 Strategic Leaders Global Summit on Graduate Education: Timed Agenda

Monday 30 September 2013

Time	Details
14:00–16:00	Registration at Hungarian Academy of Sciences, 1st floor, Reading room
16:00–16:25	**Welcome and Introduction**
	Liviu Matei, Senior Vice President and Chief Operating Officer, Central European University and **Debra W. Stewart**, President, Council of Graduate Schools
16:30–18:30	**Panel 1: National and Regional Contexts: Priorities, Capabilities, and Strategies**
	Moderator: **Liviu Matei**, Senior Vice President and Chief Operating Officer, Central European University
16:30–16:40	**Robert Augustine**, Dean of the Graduate School, Eastern Illinois University
16:40–16:50	**Yang Desen**, Vice President and Dean of the Graduate School, Harbin Engineering University
16:50–17:00	**Noreen Golfman**, President, Canadian Association of Graduate Studies and Dean of Graduate Studies, Memorial University of Newfoundland
17:00–17:10	**Eduardo Kokubun**, Provost for Postgraduate Studies, São Paolo State University (UNESP)
17:10–17:20	**Liviu Matei**, Senior Vice President and Chief Operating Officer, Central European University
17:20–17:30	**Nirmala Rao**, Associate Dean and Director of Graduate Studies, Graduate School, The University of Hong Kong
17:30–17:40	**Zlatko Skrbis**, Pro Vice-Chancellor Research and Research Training, Monash University
17:40–18:30	Discussion
19:00–21:00	**Opening Reception and Dinner, Hungarian Academy of Sciences, Kodaly Restaurant Room, Ground floor**

Tuesday 1 October 2013

Time	Details
9:00–10:30	**Panel 2: Assessing the Life-Cycle of Student Progress: Admission to Career Outcomes**
	Moderator: **Nirmala Rao**, Associate Dean and Director of Graduate Studies, Graduate School, The University of Hong Kong
	2a. Technology Tools for Graduate Recruitment and Admissions
9:00–9:10	**John (Jay) Doering**, Dean, Faculty of Graduate Studies, University of Manitoba
9:10–9:20	**Gu Jibao**, Vice Dean, University of Science and Technology of China
	2b. Tracking Student Progress through Degree Completion
9:20–9:30	**Hans-Joachim Bungartz**, Graduate Dean, Technische Universität München
9:30–9:40	**Gerard van der Steenhoven**, Dean of the Faculty and Science of Technology, University of Twente
	2c. Innovative Approaches to Tracking Alumni Careers
9:40–9:50	**Andreas Frijdal**, Director, European University Institute
9:50–10:30	Discussion
10:30–10:50	**Coffee Break – Picture Room**
10:50–12:30	**Panel 3: Using Technology to Enhance Research and Scholarship**
	Moderator: **Noreen Golfman**, President, Canadian Association of Graduate Studies and Dean of Graduate Studies, Memorial University of Newfoundland
	3a. Expanding Access to Research and Scholarship
10:50–11:00	**Lisa Tedesco**, Vice Provost, Academic Affairs & Graduate Studies and Dean, Graduate School, Emory University
11:00–11:10	**Shireen Motala**, Director, Postgraduate Research Centre, University of Johannesburg
11:10–11:20	**Wu Daguang**, Vice President and Dean, Graduate School, Xiamen University
	3b. Tools for Collaborative Research
11:20–11:30	**Kurt Sanford**, Chief Executive Officer, ProQuest
	3c. Assessing Research Outputs
11:30–11:40	**Barbara Knuth**, Vice Provost and Dean, Graduate School, Cornell University
11:40–11:50	**Bernard C. Y. Tan**, Vice Provost, Education, National University of Singapore
11:50–12:30	Discussion

12:30–13:00	**Group Photo**
13:00–14:00	Buffet lunch in Kodaly Restaurant Room, Ground Floor
14:00–15:30	**Panel 4: Online Graduate Education: Curricular Innovations**
	Moderator: **Robert Augustine**, Dean of the Graduate School, Eastern Illinois University
	4a. Innovations in Online Program Delivery
14:00–14:10	**Nicky Solomon**, Dean, Graduate Research School, University of Technology, Sydney
14:10–14:20	**Brenda Brouwer**, Vice-Provost and Dean, Graduate Studies, Queen's University, Kingston
	4b. Curriculum Design in Science, Engineering and Medicine
14:20–14:30	**Beate Paulus**, Head of the Dahlem Research School Molecular Science, Freie Universität Berlin
14:30–14:40	**Mark J.T. Smith**, Dean, Graduate School, Purdue University
	4c. Curriculum Design in the Humanities and Social Sciences
14:40–14:50	**Nick Mansfield**, Dean, Higher Degree Research, Macquarie University
14:50–15:30	Discussion
15:30–15:50	**Coffee Break – Picture Room**
15:50–17:30	**Panel 5: Risks and Benefits of Online Learning and MOOCs**
	Moderator: **Barbara Knuth**, Vice Provost and Dean, Graduate School, Cornell University
	5a. Assessment and Credentialization in Online Education
15:50–16:00	**Zaidatun Tasir**, Dean, School of Graduate Studies, Universiti Teknologi Malaysia
	5b. The MOOC Model and Graduate Education: Will it Work?
16:00–16:10	**Marie Audette**, Dean, Faculty of Graduate and Postdoctoral Studies, Laval University, Quebec
16:10–16:20	**Ernő Keszei**, Vice-Rector for Science, Research and Innovation, Eötvös Loránd University
	5c. The Uneven Impacts of MOOCs
16:20–16:30	**Julia Kent**, Director of Communications, Advancement and Best Practices, Council of Graduate Schools
16:30–17:30	Discussion
17:30–18:50	**Break – Free Time**
18:50–21:00	Dinner on boat. Meet in lobby of the hotel at 18:50 and walk to the boat, which will be waiting at deck next to Intercontinental Hotel.

Wednesday 02 October 2013

Time	Details
9:00–10:45	**Panel 6: Engagement with External Organizations**
	Moderators: **Eduardo Kokubun**, Provost for Postgraduate Studies, São Paolo State University (UNESP) and **Zlatko Skrbis**, Pro Vice-Chancellor Research and Research Training, Monash University
	6a. Technology and University Rankings
9:00–9:10	**Kyung Chan Min**, Chairman of the Committee for University Education, Presidential Advisory Council on Education, Science &Technology, Yonsei University
9:10–9:20	**James Wimbush**, Vice President for Diversity, Equity, and Multicultural Affairs and Dean, the University Graduate School, Indiana University Bloomington
	6b. Building International Networks
9:20–9:30	**Toshio Maruyama**, Executive Vice-President for Education and International Affairs, Tokyo Institute of Technology
	6c. Engagement with the Press
9:30–9:40	**Alan Dench**, Dean, Graduate Research and Postdoctoral Training, University of Western Australia
9:40–10:45	Discussion
10:45–11:00	**Break – Picture Room**
11:00–12:00	**Final Session & Drafting of Consensus Points**
	Moderators: **Liviu Matei**, Senior Vice President and Chief Operating Officer, Central European University, Hungary, and **Debra W. Stewart**, President, Council of Graduate Schools
12:00	**Conclusion**
12:30–13:15	**Press Conference at Central European University, 1st floor, Popper room**

Introduction

Graduate Education and the Promises of Technology

Debra W. Stewart
President
Council of Graduate Schools

Over the past seven years, the Strategic Leaders Global Summit on Graduate Education has created a vibrant international network of graduate institutions. When in 2007, the Council of Graduate Schools first convened the summit in Banff, Canada, our hope was to assemble an international group of graduate educational leaders to discuss questions of critical importance to graduate institutions worldwide. The dynamic exchange of information and perspectives that occurred at this inaugural summit led its participants to conclude that our conversations should continue on an annual basis. On the occasion of the Seventh Annual Strategic Leaders Global Summit, I am proud to say that we have made this goal a reality. To date, the summit has been held in seven different countries and has included graduate education leaders from nearly 30 nations.

While the goal of the first summit was to identify and discuss issues of broad relevance to graduate institutions worldwide, subsequent summits have focused on specific, pressing issues in graduate education: scholarly and research integrity (2008); joint and dual degrees and international research collaborations (2009); measuring quality in graduate education (2010); supporting and measuring career outcomes for graduate students (2011); and promoting global career pathways for graduate students and faculty (2012). Since 2012, CGS has been privileged to co-host the summit with a number of international partners, including the Australian Group of Eight (Go8) and the Deans and Directors of Graduate Studies in Australia (DDoGS); the University of Hong Kong (HKU); and the Technische Universität Munchen (TUM).

This year, we are proud to co-host the summit with Central European University (CEU) and its partner, the Hungarian Academy of Sciences, on a topic that affects all graduate institutions worldwide: "Graduate Education and the Promises of Technology." Technology-enabled tools for communication, learning and research are often a source of debate within universities because they challenge our thinking about basic principles and practices in higher education. While online learning has broadened access to graduate programs, and the development of massively open online courses (MOOCs) has opened the possibility of graduate-level MOOCs, these platforms also ask us to reconsider expectations about program quality metrics, learning assessment and credentialization. Refined technological tools have expanded access to research, but they have also raised questions about who pays for this access and who is entitled to have it. Social media have created new ways for students, faculty, administrators and the public to communicate with one other, but many wonder whether these modalities have been embraced at the expense of traditional forms of community.

While these issues are not specific to graduate education, it is safe to say that they draw greater scrutiny at the graduate level, where traditional training models have focused on individualized study programs (versus large-scale models of program delivery such as

those made possible by online programs) and more intense forms of face-to-face interaction between graduate students and faculty mentors.

The 2013 Strategic Leaders Global Summit is an invitation for graduate leaders from around the world to examine these and other issues, considering both the promises and limits of technology-enabled tools in graduate education. The planning committee for this year's summit agreed that this topic lends itself particularly well to an international forum for two reasons. First, many of the technology tools used in higher education have enabled institutions to bridge international borders, a development that affects countries differently. One example among many is online graduate education, which allows a growing number of universities to offer distance learning to students in other countries. A second reason that the topic is appropriate for an international summit is that graduate institutions have different capacities for using technology in graduate education, and diverse views about its role in learning, research and administrative processes. These differences in perspective, our planning committee believes, will prove a fruitful starting point for international discussion and debate.

Like all previous summits, the 2013 summit will begin with an opening panel in which members of the steering committee address broad questions as they relate to their own countries and regions. The main purpose of Panel 1 is to consider national and cultural contexts that shape the use of technology tools in graduate education and trends that may differ by country. The remaining panels will also take up issues of national and cultural context, but will focus more deeply on the experiences of institutions. The summit's international steering committee has approved five broad topics to organize our discussions:

- Assessing the Life-Cycle of Student Progress: Admission to Career Outcomes
- Using Technology to Enhance Research and Scholarship
- Online Graduate Education: Curricular Innovations
- Risks and Benefits of Online Learning and MOOCs
- Engagement with External Organizations and Entities

As we engage with the papers and discussions planned for this year's summit, I invite all participants to take note of areas where there appears to be strong agreement about values, practices or policies. In the final session we will review and revise a document that outlines any consensus points to which all participants can agree. Throughout the summit's history, we have learned that this statement has proved a valuable starting point for future conversations about the questions raised in this forum. I hope that this year as in the past, it will be shared widely with other graduate administrators, faculty, and regional networks of graduate institutions.

In closing, I would like to express my deep gratitude to the individuals and groups that have made this year's summit possible. I would first like to thank Liviu Matei, Senior Vice President and Chief Operating Officer at Central European University, for his exceptional leadership throughout every step of summit planning. It has been an honor for CGS to develop the summit concept with Dr. Matei and to collaborate with the highly professional planning staff at CEU. I would also like to give a very special thanks to ProQuest UMI and its CEO, Kurt Sanford, for its continued support of the summit in 2013. ProQuest's material and intellectual contributions to the summit are but one example of the company's remarkable commitment to enhancing graduate education.

Of course, it is the participants in the summit that ultimately determine its success. I would like to thank all of this year's attendees for their commitment to attending this year's event and for sharing their expertise in the excellent presentations compiled here. As always, I look forward to the creative ideas and diverse perspectives that emerge in this diverse unique forum of graduate education leaders.

1: National and Regional Contexts: Priorities, Capabilities, and Strategies

A Technology Model for Master's Programs in the Professions

Robert Augustine
Dean of the Graduate School
Eastern Illinois University (U.S.)

As a comprehensive university, Eastern Illinois University's mission is dedicated to providing superior, accessible graduate education across many disciplines; however, the university continues to emphasize its commitment to the professions. The graduate mission further amplifies that all graduate programs must provide opportunities for the discovery and application of knowledge as one component of a superior graduate degree.

One of Eastern's premier graduate programs is its Master of Science in Communication Disorders & Sciences. This highly selective master's program offers opportunities to earn the credentials required for practice across all work settings including schools, hospitals, rehabilitation centers, and private practice clinics. As a result, the program is in high demand and cannot accommodate many well-qualified applicants. According to department statistics, critical shortages exist world-wide for certified and licensed speech-language pathologists and meeting this critical shortage is part of the department's mission. Examination of the issues that contribute to the shortage revealed that many well-qualified candidates become place-bound following their undergraduate degrees and cannot return to campus for a traditional program of study.

To address this issue, the department created a hybrid program with a significant online component. The new program offers the flexibility required to attract candidates who cannot pursue the traditional program. The new program has gained campus as well as national attention. The online component provides access to courses. In addition the program has developed assessments to ensure that the students who complete the online curriculum meet the same standards of rigor and pass state-wide and national examinations at the same rates as those who complete the traditional program. Similarly, the online program provides access to tools required to complete the needed research components of the program and, through assessment of performance, the online candidates must meet the same academic standards as those in the traditional program.

The University provides the following technological tools to support this new hybrid program and the initial cohort of 15 candidates will complete their degrees in 2014. This model is now being offered as a best-practice approach for other professionally-focused master's programs at Eastern and was featured in a campus-wide summit on models of excellence in online programming at the University. It will also be shared with colleagues nation-wide through presentation at the American Speech-Language-Hearing Association.

- Digital Recording of Traditional F2F Classes and Clinic. To support the online classroom and clinical experience needs, the program adopted digital technology for recording of clinical treatment sessions and classroom interaction sessions. The Paragon Development Systems (PDS) with Intelligent Stream Recorder

(ISR) allows for IP video event recording. Digital cameras (PTZ IP) and ceiling microphones provide the high quality video and audio needed to support the clinical teaching elements. The instructor can control the camera during the event as needed to enhance on-line instruction.

- Streaming of Digital Recordings. Digital videos are saved as .wmv files to a streaming server and web links (mms:\\ ) for streaming files are inserted as links into the course management system (WebCT/D2L) for students to view. Other options on campus now for sharing video with students include YouTube and Caltura.

- Course Management System (CMS). WebCT followed by Desire2Learn (D2L) have been used in the program. The program requires that all graduate candidates have a program designated laptop computer prior to initiating both the face-to-face or distance instruction. All resources supporting both programs are available through digital resources including streaming video clips, digital case files, PowerPoint notes, web links, and other practice activities. Assessments are routinely offered for all programs using the CMS software. Discussion boards are used with some of the distance courses.

- File Sharing. Xythos (PantherFile) is a secure, web-based file-storage system available to staff and faculty at the University. PantherFile allows users to access files for uploading, storing, retrieving, and sharing. Files can be easily and securely accessed over the Internet from any location.

- Synchronous Class Meetings and On-Line Office Hours. Blackboard Collaborate (formerly Elluminate) is a web-based video conferencing system which allows participants to engage in two-way audio, multi-point video, interactive whiteboard, application and desktop sharing, rich media, breakout rooms, and session recording. Meeting rooms can be created by the instructor within a Desire2Learn course by selecting “Communications” followed by “Online Rooms”. After a student uploads the PowerPoint and lecture, the following options are available:

    - Individual students can ask/answer questions with microphone, raise hand, type message/answer, and show information using their web camera or desktop sharing application. The whole class can respond to yes/no or multiple choice questions with polling tool.

    - Instructors may use the “White Board” functions with students so that all members of the online environment may write or type information to the board.

    - Students and faculty may engage in application sharing so that the entire desktop or particular programs may be shared.

    - Faculty may create breakout rooms for small group discussion with on-line participants. If students are moderators, they can share their desktops with each other in large room or breakout rooms.

The M.S. in Communication Disorders & Sciences hybrid model allows candidates in the distance sections to see and hear lecture and discussion, and if they participate during the

live sessions they can also ask questions and participate in the discussion. Elements such as case videos, class notes, diagrams and assessment forms were made available in web-based teaching platforms including Desire2Learn (D2L) and Blackboard Collaborate. These and other elements have created a model for other masters-focused professional programs to adapt in order to provide access to place-bound candidates.

National and Regional Contexts: Priorities, Capabilities, and Strategies

Noreen Golfman
President, Canadian Association of Graduate Studies
Dean of Graduate Studies
Memorial University, St. John's (Canada)

Canada gave the world Harold Innis and Marshall McLuhan, arguably two of the most important modern thinkers about communications and media theory. The former well described how the development of new technologies led to the creation of "vast monopolies of communications" and in turn to the "continuous, systematic, ruthless destruction of elements of permanence essential to cultural activity." One could say the university is such an element of permanence. McLuhan said many things, many of which he admitted even he did not agree with, but he did say famously that "we become what we behold. We shape our tools and then our tools shape us."

Despite the prophetic nature of Innis and McLuhan's writings, it is fair to say that Canada has been almost deliberately slow to jump on the MOOCs or equivalent bandwagon. Our institutions have been typically cautious and observant, monitoring the hype and noise attendant to the MOOCs and related phenomena in 2012, not rushing either to dismiss or embrace new learning platforms. Such tentativeness might be considered ironic in view of the fact that it was a Canadian (Dave Cormier) at the University of Prince Edward Island who coined the acronym MOOC in the first place, way back in 2008. He was writing about two other Canadians, George Siemens and Stephen Downes, who had launched an online course at the University of Manitoba to which 25 students paid and about 2,300 online participants registered for free.

There are 98 universities in Canada and, to date, (only) 3 have signed up with one of the larger providers, such as Coursera and Udacity, to offer massive online open courses. One might say the rest of us have been watching carefully. As one PSE commentator in Canada recently wrote (Leo Charbonneau), "The MOOC is dead, Long Live the MOOC." Put another way, we could say death of the MOOC might be greatly exaggerated, but we are not quite sure what form, if any one form or model, it will end up being borne into. The original motivation for delivering a MOOC, at least according to the two Canadian university innovators, was a focus on building open networks of knowledge and collaboration. These were experimental learning experiences, not business ventures. Canada's university system is a public one and so debate about the value of MOOCs has run in circles around questions of how they are meant to be funded. The appeal of the wide access MOOCs provide is indisputable, but there are still large areas of Canada without adequate bandwidth service, particularly in rural regions and in the far north. This fact alone makes the claims about MOOCs disrupting hierarchies and helping the unprivileged somewhat hollow. We are all, or certainly we need to be, asking questions about who is being left out of the ostensibly wide circle of outreach. The blogosphere has been persistent in raising these ethical questions.

At the beginning, and at its weakest, this debate had pretty well shaped itself into two

opposing camps, with a MOOC-friendly, business model of disruption on the one side and an idealized university/college steady-state view on the other. But such a binary framework for discussion has inevitably given way to a more nuanced appreciation of both sides of the spectrum. And so while large, traditional universities in the US were buying into the promise of MOOCs in 2012, by and large Canadian universities were holding back, more comfortable with assessing the merits and weaknesses of the earlier models. After all, most Canadian institutions have long been offering online distant learning courses for credit.

At the very least, almost all but the most conservative educators acknowledge that the "sage on the stage" model of classroom delivery, especially for freshmen classes, is no longer the only model, if even a model at all anymore. Any self-respecting instructor today is compelled to face the challenge of how best to integrate information and communications technology into the classroom. These generally include email and word processing and presentation software; less frequently deployed but emerging as elements in the ICT classroom are blogs, wikis, computer games, Skype, simulations, Twitter feeds, and specialized software.

The University of Regina in Saskatchewan is a useful case in point. There, a new MOOC on educational technology and media has effectively tweaked the original model to encourage much more interaction among course participants, adding an optional in-person element at the end of the ten-week regime. The designers of the course see it as a "community as curriculum" experiment, with focus on knowledge networking itself. By most popular MOOC standards, a course with only 1,900 registered students isn't massive at all, but by Canadian university standards it's pretty awesome.

At the moment, the appeal of universities giving their wares or services away for free is, according to one of our national newspapers, "part branding exercise, part international outreach and part hard business sense." Cormier, who first coined the term MOOC, recently noted that we are on the verge of shifting to a pay-for-credit version of these online courses, a shift that will radically challenge the foundational public system of which Canadians are so proud. The real revolution, he has said, is not pedagogical; it's economic.

But it is pedagogical, too—at least, in part, because if any version of a MOOC is to succeed it better be interesting. A recent study in Quebec found that students there at least prefer the "old school" approach of an engaging lecture over the use of the latest technological bells and whistles in the classroom or online. ICTs don't mean a thing if they ain't got that swing of a lecturer's engaging performance and delivery. Marshall McLuhan also once said that "anyone who tries to make a distinction between education and entertainment doesn't know the first thing about either." It's not the tools but what you do with them that makes or breaks a course's effectiveness.

Not surprisingly, the earlier model of the MOOC is yielding to more hybrid models that mix online and in-classroom learning, and that marry bells and whistles to dynamic discussion groups or social media connectedness. In Canada, these are the pathways we are fruitfully exploring in the changing postsecondary landscape of new technologies. The emergence of new forms of course delivery is a natural consequence of the times and the sheer persistent fact of the MOOC. This is a welcome trend, one that is taking us away from the dead-end discussions of corporate or venture capital business models. Especially notable is a new addition to the online landscape, founded just four months ago, the Canadian-based Wide World Ed, a progressive project that will begin to offer courses at Canadian universities this fall. World Wide Ed promises to provide courses from non-traditional educators and

will be offering both university-style classes and continuing education courses in English, French and First Nations Languages. Its web site announces its mission: "Striving for Global Peace and Prosperity through Education." This is a social justice mission, perhaps the first of its kind anywhere. This is also the kind of unintended consequence of new technologies McLuhan also speculated about, the possibility of a global village of learners unbound by elite or corporate interest. One might say that its Canadian proponents are intent on changing, maybe saving, the world, one open online course at a time.

Finally, it is well to remember McLuhan's oft-quoted comment about the modern condition—that "our Age of Anxiety is, in great part, the result of trying to do today's job with yesterday's tools and yesterday's concepts." If he were alive today he might be saying our anxiety is, in great part, the result of trying to do today's job with tomorrow's tools and tomorrow's concepts.

Technology in Brazilian Graduate Courses: A Challenge to Move Away from the Commonplace

Eduardo Kokubun
Dean of Graduate Studies
São Paulo State University-UNESP (Brazil)

Brazil is experiencing an accelerated expansion of the graduate system. Until the 1980's it was necessary to train human resources to work at Universities. Since 1990, the priority has been altered to focus on the training of researchers for research institutes, universities and the industry. Nevertheless, the system still presents a very strong demand for higher education teachers training.

In part, the demand for higher education personnel can be attributed to the unprecedented expansion of undergraduate education. From 1995 to 2010, the number of students enrolled in undergraduate courses has quadrupled, reaching more than six million students. The number of graduate students has increased about 2.5 times, reaching 190,000 in 2011.

Although this growth is significant, many related issues are still unresolved, considering the needs of the country. Among the population between 18 and 24 years old, only 19% effectively pursue a college degree. Among adults between 25 and 64 years old, only 11.6% have gotten college degrees, a much lower percentage compared with OECD countries (31.5%). For Brazil to achieve even such an average level, it would be required to increase threefold the number of undergraduate courses, implying also an expansion of graduate training in different areas.

In 2011, 380,000 teachers (29% PhD and 38% master) were enrolled in higher education, 54% at universities, 17% teaching in graduate schools. Thus, the Brazilian system of higher education still needs to improve the qualification of about 120,000 teachers without master's or doctoral degrees. In addition, a threefold increase in the number of graduate courses is required to deliver other 760,000 master's and PhD students.

Whereas 56,000 students accomplished graduate degrees in 2011, it would take 16 years to reach said goal, and even then only for higher education. There is also the need of job positions for graduate training in the non-academic sectors. In Brazil, the priority is to increase the efficiency of the training system for higher education with new paradigms and creative methodologies, including the use of new technologies.

Like several other countries, the use of Information and communication technologies (ICT) in Brazil has been spreading quickly. Last year it has been marked by the surpassing of the cellular phone line per capita landmark, with 83 million Internet users and 55% of households with computer. ICT is present in the everyday life of the Brazilian citizen.

The most prominent use of ICT in research and graduate education is a national centralized digital online resource that allows any person to search information on researchers, research groups and graduate courses, managed by the Ministry of Education and its branches.

The “Lattes” system is a broad public Internet database of academic curricula, maintained by the National Council for Scientific and Technological Development (CNPq), partnered to the Ministry of Science and Technology. Almost all researchers in Brazil have a curriculum in the “Lattes” which can be viewed by anyone worldwide.

The evaluation system of graduate education in Brazil is driven by the Coordination for Enhancement of Higher Education Personnel (CAPES). Each of the 3,342 programs provides the data of all activities undertaken in the previous year. Each student is individually registered; and finds detailed information on courses offered, the articles and books published, patents and any other type of intellectual production. Theses and dissertations are also indexed, uploaded and made available for public consultation. CAPES also maintains and pays for a national electronic library. Faculty members, researchers, graduate and undergraduate students of 407 institutions have free access to the full-texts of more than 33,000 journals, theses and dissertations (of these over 460,000).

Although the use of ICT has grown substantially, its use for academic purposes is still very incipient on some levels. Notably the use of e-learning, which is still confused with distance learning, is the target of a lot of prejudice. Only in 2005 were e-learning courses fully regulated. In 2012, about 15% of regular undergraduate students were in the e-learning education system, especially in areas of training for primary and secondary school teachers.

Only in 2011 with support of the Federal Government was the first e-learning graduate course ministered in Brazil, to train Brazilian’s mathematician teachers.

There is yet no reliable data on the use of ICT in graduate schools. The National Plan of Graduate Education (PNPG) for 2011-2020, launched in 2010, pointed out several challenges that Brazil must yet face. Among them are reducing the regional and inter-area asymmetries of the system and meeting the need for social insertion, including more active interactions with educational and productive systems as a whole. However, the PNPG has neither delivered any diagnostic of e-learning, nor identified it as either a tool or challenge for research and graduate education.

Noteworthy is a Government initiative in the creation of the Open University of Brazil in 2006, a network that brings together more than 100 Brazilian public universities. Although geared specifically to offer e-learning courses, there is a great expectation that the ideas and practices that will be generated, may contribute to create a more favorable environment for the use of ICT in higher education in Brazil.

Much of the effort has been spent to develop a large database containing useful information for the assessment of research and graduate courses. However, it is not enough to provide a qualitative leap of the system. It could be used more creatively to provide for example, greater exchange between Brazilian and foreign researchers and centers.
The scenario here is not quite different from those presented by other users of the teaching technology. There is a urgent need to investigate in depth the way to incorporate the technology in the training of researchers in the graduate courses, preparing teachers for the appropriate use of those methodologies, regardless if by e-learning or face-to-face teaching, thus bettering the use of data contained in the national databases and digital infrastructure.

Graduate Education and the Promises of Technology: The European Policy Context

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European policy frameworks for higher education

Two distinct, occasionally overlapping, European policy frameworks have influenced developments in higher education on the continent over the last almost 15 years. The first one is represented by the Bologna process, an intergovernmental process currently involving 47 countries and the European Commission, with the aim of creating a European Higher Education Area. The second one has emerged as part of the European Union's overarching development strategies, first Lisbon (2000-2010), and then the Europe 2020 strategy (2010-2020). The EU's policy framework for higher education had as its main goal to stimulate, if not compel, higher education institutions to make a direct contribution towards the explicit targets and priorities of the respective overarching strategies.

The higher education dynamics in Europe during this period have not been exclusively a result of initiatives, regulations or, more generally speaking, "conditions" related to these two policy frameworks. Far from that, the work of higher education institutions has also been influenced, to different extents in different parts of Europe, by their own internal dynamics, decision-making, and initiatives; by national evolutions (including national higher education policy making); by larger international trends and developments; or by interactions between these factors. The fact remains, however, that the European policy frameworks played a very significant role as well. Higher education in Europe cannot be understood without taking them into account. They will also continue to have an impact in the near future. This is true for all levels of higher education (or "cycles", using the Bologna vocabulary), including its graduate layers, and for many particular aspects within each level. One could ask if this is also true with respect to technology. ***Are there any relevant provisions as part of these policy frameworks with regard to the use of new educational technologies in graduate education? If such provisions exist, what is their impact to date and potential future impact?***

The impact of the Bologna process and the Lisbon/Europe 2020 strategies on graduate education

The very notion of "graduate education," the way it is currently understood in Europe, is largely a Bologna creation. The concept of a "master program" did not exist at all in most European countries before Bologna. The understanding, organization, and delivery of doctoral education have been thoroughly transformed by Bologna. The Bologna process made possible a new, in fact unprecedented, space for dialogue in European higher education. This had as series of major consequences for graduate education. For example, it made it possible to arrive at a European definition of doctoral education, reflected primarily in the so-called Salzburg I and II principles (2005 and 2010). Beyond the mere definition, in operational (pedagogic, institutional) terms, the Bologna process supported a transition to a

new model of doctoral education, reflected in the concept of doctoral school. The adoption in 2005 of the overarching framework of qualifications of the European Higher Education Area contributed to further clarifying the distinctions among various cycles, and to the emergence of a common European reference for both graduate and undergraduate education, by adopting European-wide, generic descriptors formulated in terms of learning outcomes, competences, and credit ranges. ***It can be stated that one of the main impacts of the Bologna process was conceptualizing graduate education (master and doctoral,) broadly speaking, in the European Higher Education Area.***

The impact of the EU's higher education policy framework was different, resulting from a different institutional anchoring of this framework and from a situation of direct subordination of higher education policy to the larger objectives and priorities of the Union. This includes the fact that, unlike Bologna, the EU policy framework for higher education was supported by relatively effective means and tools (including legislation and budget). ***The EU's attention in graduate education was largely focused around the notions research, mobility, and careers.*** For example, through a series of formal regulations and funding initiatives (and conditions) the EU finally defined doctoral education almost as being strictly about the production of research (not even as training of researchers). The EU embraced the position that doctoral students are actually not ***students*** but simply ***researchers*** (early stage), and that their role is not so much to learn but to produce research (immediately), a status that should be honored through a salary rather than a stipend. The EU promoted and funded a major series of initiatives to stimulate ***mobility*** of doctoral students (or early stage researches) and master students, primarily but not exclusively within the EU, such as the Marie Curie fellowships program, and the Erasmus Program. The EU promoted or supported an array of initiatives meant very specifically to promote the ***career*** advancement of doctoral graduates (for example trough the EURAXES "researchers in motion" platform). ***The main concern as part of this policy framework in the area of graduate education appears to have been about mobility, careers and research, which in turn and together were expected to contribute directly to the economic (and possibly social too) strengths of the Union.***

European policy frameworks for higher education and the promises of technology

It can be stated that for a long time only very little attention, if at all, was paid to matters of learning, pedagogy and contents as part of the two policy frameworks discussed here (this situation is changing currently). The focus was on primarily on structures, for Bologna, on structures and on the research output for the EU. This was also reflected in the nature and magnitude of the provisions with regard to the educational technologies. In the context of Bologna, one could come across some generic statements about the importance of ICT for higher education. Somewhat more specifically, at their last meeting (2012), the ministers responsible for higher education mentioned the need to promote "innovative methods of teaching that involve students as active participants in their own learning," but there is no mention of educational technology per se in this context. In short, there are basically no statements, initiatives, or any kind of major provisions regarding the link between graduate education and educational technology under Bologna. The situation is different for the EU.

The European Union endeavored to pay systematic attention to the use of technology in education in general. An ***e-learning program*** was adopted and funded starting in the early 2000's. The concern regarding the role of ICT for learning become a priority of what is called a "transversal" part of the EU's Lifelong Learning Program under Europe 2020 (which is not only about higher education). For the specific area of graduate education, one could observe

recently that while the EU priorities remain focused around research (also connected with mobility and careers), the EU started to pay more and more attention to aspects relating to teaching and, in this context, also to educational technology. A recently appointed ***EU High-Level Group on teaching in higher education*** is itself a premiere. The group's report put forward far-reaching recommendations to be considered by the EU member states. They include recommendations regarding the use of new technology and pedagogic tools (by the teachers), language about the importance of online and open online courses. Although this particular development is still to be reflected in actual policies at the EU level, it appears to mark a significant step forward in the direction of a deeper engagement of the EU in promoting educational technologies for teaching and learning in higher education. The EU has already started itself or provided support for new major initiatives in this area. A first ***European MOOCs platform (openuped.eu)*** was launched this year with financial and political support from the EU. This initiative is coordinated by the European Association of Distance Teaching Universities (EADTU), possibly the most important player in Europe in promoting the use of new technologies in higher education in Europe, including specific initiatives at master and doctoral level. ***Openuped.eu*** offers currently about 70 courses, also by non-EU universities. What is particularly "European" about this initiative is that fact that, reflecting diversity of languages in Europe, courses are also offered in other languages than English.

There are a few other examples of policy "concerns", if not provisions, and also actual initiatives, aiming to take advantage of the "promises of the new technologies" for higher education, including graduate education, in the EU. The renewed attention to teaching and technology might reflect in part new developments and trends in the world but also the new objectives for higher education of the Europe 2020 strategy. They put forward quantifiable targets, such as about access and completion (40% of 30-34 years-old to complete a tertiary education degree), participation in lifelong learning (15% of all adults), "learning mobility" (20% of all students to have a period of study abroad), etc.. It is in a way not difficult to make the link between these objectives (mobility and access in particular) and the promises of the new technology. ***A serious policy discussion regarding the potential use of technologies in higher education, graduate education included, in the EU is very much at the beginning. Unlike earlier times, now this matter is clearly on the agenda.*** This discussion may result in important contributions at the level of the policy framework. As with other good policy beginning in Europe, it is not clear how far and how fast it would go. This speaks for the need for higher education institutions themselves to reflect, plan, and act.

National and Regional Contexts: Priorities, Capabilities, and Strategies

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China's 12th 5-year plan (Government of the People's Republic of China, 2011) articulates strategies for scientific development which include (i) enhancing capabilities in indigenous research; (ii) promoting innovation in science, technology and administration; and (iii) improved education and training of students. The country wishes to become known for innovation. Graduate education and research are pivotal to achieve these goals and in recent years, China has seen an unprecedented increase in the number of higher education institutes and in allocation of funding for research. Indeed, government research funds in Mainland China have been increasing at an annual rate of more than 20% (Shi & Rao, 2010) with a concomitant increase in the number of graduate students. The sequel to this increase is that it has positively impacted the country's capabilities to undertake cutting edge research and train graduate students. However, this increase has also brought challenges. Against this background, this paper identifies capabilities, challenges, risks and priorities in research and graduate education in China.

Capabilities for Research and Graduate Education in China

Mainland China

The latest statistics released by the Ministry of Education (MoE) in Mainland China (Yu, 2011) revealed that in 2011 there were 755 institutions offering master and doctoral degrees. These institutions include 481 colleges and universities as well as 274 research institutes. A total of 560,200 graduate students (65,600 doctoral students and 494,600 master students) secured admission to graduate programs in 2011, an increase of 22,000 students (4.09%) compared to the previous year. The total number of graduate students was 1,645,800, an increase of 107,400 (6.98%) from 2010. This impressive increase in the number of graduate students is unprecedented in China's higher education system.

In addition, in 2011, there were 5,010 research institutes with 218,596 staff members and 233,265 graduate students. The government expenditure on research in higher education was approximately 22.8 billion Yuan (US$ 3.74 billion). The MoE funded 125,513 projects as detailed in Table 1.

1 Professor Ben Young, Assistant Dean and Programme Director (Outreach), Graduate School, The University of Hong Kong helped prepare this paper.

Table 1. Research institutes by research field for higher education institutions in 2011

Research field	Number of institutions	Number of staff	Number of graduate students	Funds in thousands US$ (thousand Yuan)	Number of projects
Material science	352	19,048	20,900	354,388 (2,165,315)	10,541
Electronics and communications technologies	302	14,120	20,884	328,101 (2,004,699)	8,184
Mechanical engineering	321	13,952	15,052	276,014 (1,686,448)	7,804
Biology	351	14,023	17,168	265,279 (1,620,858)	8,851
Chemical engineering	180	7,252	10,096	154,278 (942,637)	4,930
Chinese medicine	299	8,293	4,657	45,229 (276,352)	3,764
Others	3,205	141,908	144,508	3,694,939 (22,576,079)	121,749
Total	5,010	218,596	233,265	3,740,168 (22,852,431)	125,513

Source: Compilation of Statistics from Science and Technology of Higher Education Institutes, 2011

The establishment of National and State Key Laboratories have enhanced the quality and quantity of research in Mainland China. The State Key Laboratory Scheme was initiated in 1984 to support respected scientists and scholars to conduct seminal research to further support China's technological and economic development. These laboratories are of the highest international standards. Currently, there are nine national laboratories, namely the Beijing National Laboratory for Molecular Sciences, Beijing National Laboratory for Condensed Matter Physics, Beijing National Laboratory for Condensed Matter Physics, Tsinghua National Laboratory for Information Science and Technology, Beijing Electron Positron Collider (Chinese Academy of Sciences, 2013), Hefei National Laboratory for Physical Sciences at the Microscale, National Synchrotron Radiation Laboratory, Wuhan National Laboratory for Optoelectronics and the Institute of Modern Physics; and another ten national laboratories are under construction. There were 103 state key laboratories in 2010 (List of State Key Laboratories, 2010); these are universities and private sector laboratories that currently receive funding and administrative support from the Central Government. The State Key Laboratories cover different areas of research, such as ocean engineering, chemistry, medicine, physics, mathematics, materials science, and structural engineering. Currently, there are around 300 state key laboratories in China. It should be noted that there are State Key Laboratories outside Mainland China, and there are 16 in Hong Kong with five at The University of Hong Kong.

Table 2 shows the research funding allocated to the highest ranked universities in China by the MoE. Peking University, Tsinghua University and Zhejiang University are ranked as the top three universities in Mainland China and Tsinghua University had more than 1,400 scientific and technological research projects funded by MOE in 2011 (Tsinghua University, 2013). In 2013, Tsinghua University had 311 research institutions/centres including one national laboratory for Information Science and Technology, one national large research

infrastructure for Protein Science, two national large-scale scientific instrument centers and thirteen State Key laboratories.

Table 2. Ranking of research funds for major higher education institutions in 2011

Ranking	University	Funds in thousand US$ (thousand Yuan)
1	Peking University	431,344 (2,635,511)
2	Tsinghua University	395,968 (2,419,366)
3	Zhejiang University	370,343 (2,262,794)
4	Shanghai Jiaotong University	342,288 (1,981,402)
5	Fudan University	250,761 (1,532,150)
6	China Agricultural University	219,396 (1,340,507)
7	Huazhong University of Science and Technology	199,377 (1,218,196)
8	Northwestern Polytechnical University	190,449 (1,163,644)
9	Beijing Institute of Technology	189,966 (1,160,692)
10	Sun Yet-sen University	181,706 (1,110,222)

Source: Compilation of Statistics from Science and Technology of Higher Education Institutes, 2011

The main research fields in Peking University (also known as Beida) are Humanities, Social Sciences and the Natural Science. In 2011, it received funds of over US$ 431 million (2.64 billion Yuan) from the MoE, which is clearly an indication of the strong momentum for the university to move forward in research and higher education in Mainland China. Peking University has one National Laboratory in the area of molecular sciences and ten State Key Laboratories (Peking University 2013).

Hong Kong

The Research Grants Council (RGC) provides the majority of funding for research in the eight local government-funded universities in Hong Kong. The annual budget was around US$ 121 million (HK$ 940 million) in 2011. The allocation of earmarked research grants covered the Theme-based Research Scheme, General Research Fund, Collaborative Research Fund, Joint Research Schemes and other schemes. Approximately 68% of the RGC's budget was allocated to the General Research Fund and a total of US$ 83 million (HK$ 641 million) was allocated to fund 801 research projects out of 2,572 applications in 2011 (Chin, 2012). Of the eight government-funded universities, The University of Hong Kong received the largest amount, of around US$ 20.7 million (HK$ 161 million). It should be noted that the allocation of research funds by the Hong Kong Government from the RGC was only 28% of the annual funding allocation to Peking University by the MoE.

Needs and Benefits

China has enjoyed unprecedented economic growth over the past few decades and this has fuelled the development of higher education and research. At the same time, there has been an emphasis on moving away from traditional modes of "chalk-and-talk" instruction to approaches to learning and teaching which foster creativity and innovation. The higher education institutions (HEIs) are now becoming the main force of national science and technology invention system in Mainland China and several high-tech enterprise clusters have been built near some of the HEIs.

Challenges and Risks

Shi and Rao (2010) have analysed the research funding distribution system and the research culture in China. They pointed out that the committees appointed by bureaucrats in the funding agencies determine the guidelines for funding allocation. As a result, a significant proportion of researchers in Mainland China spend a lot of time building relationships with committee members and other people involved in the funding allocation, and spend less time on research and training students. However, progress has been made in reforming the management systems and education provision systems of the HEIs (The 9th 5-Year Plan for China's Educational Development and the Development Outline by 2010, 2009). The central government now works together with the local governments to strengthen the higher education system and the funding distribution system in Mainland China.

Priorities

The efforts in science and technology research in HEIs, as stated in the MOE 9th 5-year plan for China's educational development (2009), "have been further strengthened with a remarkable increase of input to it and a smooth transferring of outcomes." Due to the fast economic growth in China, there is a large demand for science and technology research. The Central Government continues to invest in HEIs. Therefore, the quality of research and graduate education will continue to improve in Mainland China.

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Graduate Education Challenges: Where Do Technology Fit In?

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Educational technology has revolutionised almost every facet of education: from the way in which classes are delivered to how lectures are accessed and learning is experienced. It could easily be argued that technological capabilities of the modern university in administration, research and teaching uniquely delineate their opportunity horizons. In this paper I would like to make some broad comments on the conference topic 'graduate education and promises of technology', including some observations specific to Australia.

If forced to rank key Australian challenges in graduate education, I doubt the question of technology would be either on my list or that of fellow leaders in graduate education. Our preoccupation is mostly with the issues that are shared globally: funding of graduate education, pathways into PhD programs, completion times, improved industry partnerships in the context of graduate education and the overall quality of graduate student experience. There are probably a few more topics that could be added to the list but they are not likely to include any specific technology-driven issues (or at least they would not be seen as such).

In Australia, we have a solid informational and technological infrastructure which helps us connect our researchers with educational and research opportunities around the globe. Informational and technological platforms are so intrinsically linked to day-to-day educational and research components of graduate education that they tend to – rightly or wrongly – blend into background. This does not mean that technology is of no relevance. It simply means that it can no longer be treated as separate from the educational experience. This apparent invisibility of technology is misleading because it in fact drives virtually every facet of graduate education.

For the purpose of this discussion, I would like to divide technology used in graduate education as falling into five categories: a) critical administrative systems technology infrastructure, b) research enhancing, c) value-adding, d) curricular, and e) cutting-edge technologies. In practice, these categories can never be neatly separated.

Critical administrative systems technology infrastructure. There is a vast range of administrative systems technology infrastructure which supports graduate education processes. In the context of ever stronger global and national competition for graduate student talent, this infrastructure is gaining in importance. It includes the admission systems, promotional web-based interfaces, and candidature management and examination tools. The visibility of the institution and its graduate program, the speed with which technology-enabled systems convert expression of interest into offer, and the experience of the graduate studies applicant in navigating application processes, make for critical elements of competitiveness. As graduate education leaders we often focus on vision and innovative approaches to graduate education but the neglect of these critical technology-driven

administrative systems may prove disastrous.

Research enhancing technologies. It is practically impossible to imagine a graduate research project bereft of technological tools, which may range from a mandatory computer to perhaps electronic microscope and even synchrotron. In many fields of research, the 'big toys' are the prerequisite component of research generally and graduate education in particular. Technological infrastructure is both an enabler of graduate projects but also an institutional pull factor for graduate students who may require technology to execute their projects. Access to technology is also often a key driver behind the partnership between universities and industry – a partnership often utilised for the benefit of graduate students.

Value-adding technologies. These are technologies that serve as critical enablers of good practice in graduate education. They enable graduate alumni tracking, evaluate graduate experience, or measure bibliometric outputs. They provide a feedback loop to the graduate education portfolio but also add value and benefits to the institution as a whole. As a rule of thumb we would say that universities which excel in the utilisation of these value-adding technologies tend to be the ones that lead innovation in graduate training.

Curricular: As the agenda of this meeting suggests, many institutions offer online programs and combine these with traditional delivery of education. Importantly, these online programs may not be seen as exclusively limited to the use of graduate students but may be used to support professional development of graduate supervisors as is the case at my own institution. The very same technology interface can thus be beneficially utilised by both graduate 'teachers' and 'learners'.

Cutting-edge technologies (e.g., MOOCs). MOOCs perhaps deserve a separate category because they are on the cutting edge of the educational horizon. Nevertheless, MOOCs are not a 'technology' but simply technologically enabled educational offerings. In fact, they share a lot in common with curricular technologies but their rapid rise and potentially revolutionary impact on almost every aspect education (from learning, assessment to cost/access) dictate a special mention. Although much has been written about the MOOCs (Bowen 2013) very little commentary has been given to MOOCs in the context of research graduate studies. On the face of it, MOOCs could be easily adopted for taught components of graduate training; yet, they appear antithetical to research-based components of graduate programs which are inherently predicated on unique encounters with highly specific research problems. In Australia, which is becoming rapidly MOOC-isied (Guthrie 2013), one clear possibility for the introduction of MOOCs into graduate education is in relation to professional development components of graduate programs where institutional uniqueness does not play a critical role. For example, there are opportunities to develop MOOCs on topics such as grant writing and time management skills, which could easily cut across sector needs. These would be particularly useful where the content is dictated by regulatory requirements (research integrity) or industry needs (research commercialisation) and where MOOCs could be rolled out at a national or university-alliance level. Yet, this is largely an unchartered territory albeit one which should be traversed soon if the full potential of MOOCs is to be realised.

The purpose of this commentary was to fundamentally highlight the extent to which technology is actually immersed in, and integral to, educational effort. Graduate education is no exception. I simply endeavoured to highlight the need for us to understand technology in all its manifestations in so far as they relate to graduate education effort. Although educational technology must be taken seriously, we should avoid what social scientists call

'technological determinism' – an excessive fixation with technology where technology becomes an end in itself. It is essential that we understand technology for what it is: an opportunity for improving every single facet of educational opportunities. As such, educational technologies must always be understood relative to the educational context and aims. If they are not, we easily miss the point.

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2: Assessing the Life-Cycle of Student Progress: Admission to Career Outcomes

Recruitment, Admissions and Technology

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Introduction

Some of us remember seeing posters on bulletin boards advertising graduate studies at the University of 'X'. The effective posters were eye catching – a happy graduate student in an academic setting or an iconic building at University 'X'. There was an address on the posters that one could write to request an application package. Oh how times have changed. Recruitment posters on bulletin boards are extinct and paper applications are now few and far between.

Using Technology to Enhance Recruitment and Admissions

The Internet has become the tool to attract and recruit students. Students troll the net comparing graduate programs, university laurels, and funding packages. Professors are frequently inundated with emails from prospective graduate students. Effective recruitment webpages need to be attractive, user friendly, and Google metrics driven: the most frequently sought information (such as the graduate programs available, funding, admission requirements, and how to apply, etc.) should be no more than a click or two away. Webpages need to be compatible with a variety of operating systems and browsers.

There are a lot of (not-for-profit and for-profit) websites that attempt to draw together information on graduate programs at different universities. Such Canadian websites include aucc.ca and canadian-universities.net. These websites then direct students to the relevant university's graduate program webpages. It's possible to determine which sites are effective in directing students to the university's graduate webpages.

The University of Manitoba uses Hobsons software to enhance the graduate student experience associated with recruitment and admissions. We currently have two admissions/recruitment related modules: ApplyYourself® and Connect® CRM (client relations manager). Although we had a paperless admissions system prior to installing Hobsons ApplyYourself® and Connect® CRM, these two software packages have been game changers for enhancing the application and recruitment experience.

ApplyYourself® allows prospective students to upload their required documents thereby facilitating provisional admission in a timely manner. Prospective students can track all aspects of their application online. Have reference letters been received? Is their application complete? Has the department reviewed their application? Has an admission decision been made? When a prospective student completes an application in ApplyYourself® that application is immediately available for consideration by the relevant department, allowing for quick admission decisions. The system reminds and encourages prospective students with

incomplete applications to finish their application. ApplyYourself® and Connect® provide a seamless application experience.

Connect® CRM provides the functionality to develop a specific communication strategy/plan for each graduate program at the University of Manitoba. Communication plans can be used to track specific advertising initiatives or events and the media used to communicate them. Automated communication can take the form of SMS texts (within Canada and the USA), letters, emails, webpages, or RSS feeds. With Connect® it is easy to stay "engaged" with a student from the moment s/he first lands on the University's homepage until the day they register and beyond. Student relationships can be built with personalized portal pages and customized communications, some triggered automatically based on particular behaviours (such as clicking a link). Connect® also provides multiple levels of data analysis – from tracking the source of each student record to creating visual reports that compare values to exporting data for complex analysis. Within Connect® CRM we also have the Hobsons Events module. This is a complete event planner that facilitates the ability to create events, manage registration, waitlists, and communication with registrants. This module can facilitate events such as orientation and workshops.

Which Social Media or Web-tools are the Most Effective?

It is difficult to say with certainty which social-media or web-based tools are most effective in attracting students to the University of Manitoba. Our faculty of graduate studies webpages receive hundreds of thousands of views per month. The challenge is to drive prospective students to the faculty of graduate studies homepage from other sites. We will be experimenting with various for-profit websites this year to determine which site(s) are most effective at driving prospective students to the faculty of graduate studies homepage. By normalizing the cost of advertising on various sites by the number of prospective students that complete an application and/or are admitted, it will be possible to determine the cost effectiveness of various site(s).

We have more than 2,100 "Likes" on Facebook, whereas about 9% of graduate students follow us on Twitter. We are in the process of setting up a tumblr account for photo and text blogs.

Improving the Review of Student Applications

We are in the process of assessing Hobsons AppReview software, which is a web-based interface for reviewing applications completed through ApplyYourself®. AppReview® facilitates viewing applications from anywhere (with internet) and is mobile device friendly. The interface in AppReview® allows reviewers or decision makers to create a customizable 'inbox' that displays only the information the user wants to see. There is no need to scroll through each individual application file. Instead the user creates a 'dashboard' of the relevant information, with more in-depth information only a click away. All of this serves to significantly streamline the processing of applications between graduate units and the faculty of graduate studies.

Acknowledgment

The comments and input of Ms. Rebecca Tataryn on this article are gratefully acknowledged.

The Recruitment of Graduate Student and the Use of Information Technology

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University of Science and Technology of China (People's Republic of China)

How to recruit talented graduate students is a great challenge for the University of Science and Technology of China (USTC), and the challenge results from three factors: (1)the location of USTC, (2) the structure of USTC academic programs and (3) the trend of USTC undergraduate students going abroad.

USTC is located in the capital of Anhui province, Hefei, a moderately large city in the midst of China, and the city can be allocated to the middle and lower of Yangtze River. Compared with the surrounding big cities like Nanjing and Shanghai, it is less developed, and there are fewer opportunities to find a good job. Besides, USTC is the only tier-one university (Project 985 universities) in this city, and there are not enough good applicants choosing this city to study in.

USTC academic programs are mainly science-based, such as mathematics, physics, chemistry, material sciences, geography and biology, and there are some fields related to technology, such as computer, information, mechanics and energy. This academic structure prevents the recruitment of good graduate students because fewer students tend to pursue science all over the country.

In USTC, the better part of its undergraduates choose to go abroad rather than study in USTC for graduate studies.

Faced with such a big challenge, USTC has taken the following measures to recruit talented students to its graduate programs, including recruitment strategy innovation, massive recruitment marketing of faculties and the use of information technology.

Strategy innovations include some policy making and execution. The first is to increase the ratio of exam-free recommendation graduate students because only excellent students can get the qualifications to be exempted from the graduate entrance examination by the Ministry of Education. In 2011, 2012, and 2013, the numbers of students we recruited from this category were 890, 970, and 1,130 respectively. Now the ratio of exam-free recommendation graduates is 60% of the graduate student body. Besides, we recruit students from the top universities, such as 985 and 211 universities.

The second measure is to develop integrated master-doctoral graduate programs, in which students directly get a doctoral degree without a master degree. In general, they spend five to six years to complete their graduate studies. Meanwhile we reduce the three-year doctoral programs which recruits master's degree holders, and thus most graduate students can spend more time getting very good academic training and doing research. This policy is beneficial for the development of graduate programs.

The third measure is to establish a feedback mechanism of graduate program quality assurance. For every degree granted, the graduate school will do assessment work to control the quality of graduates in each major and this assessment will be linked with the following year's recruitment quotes of graduate students in each major. This feedback mechanism ensures that each department and school in the university will pay more attention to the graduate's quality.

The graduate school has taken many initiatives in marketing to recruit excellent students. We have arranged for many professors (usually over 100-200 professors each year) from different schools to go to big cities to do marketing (16 in all for these three years). We have visited almost all the main cities where there are top universities in China, and usually we rent a 5-star hotel to hold a recruitment fair in each city. We attract many undergraduates from famous universities in the city. We give introductions to academic programs, schools and the University as well. Interviews are done at the same time, and letters of pre-acceptance are issued for qualified students. Additionally, we have held seven summer camps involving most of the big disciplines at USTC, admitting over 1,000 graduate students from all over the country to USTC.

We also use IT to improve our recruitment work. We first built a special recruitment webpage for graduate programs. On this webpage, there is enough information about each program, including the goals and content of the program, the details of professors' research and teaching, as well as famous alumni information. Secondly, we have established an IT system to accept the application for interview in the local cities in the period of faculty direct marketing. The applicants need to fill in the required information on the website, and this lets us know how many students will be interviewed in the target city, increasing the efficiency of the arrangement of review work for professors in different cities. Thirdly we built a system to recruit the members of summer camps. The applicants of summer camps provide the required information in the website and then send their paper materials by post. We organize experts to review these materials and select the excellent applicants to take part in our camps. A web- club for summer camp is set up, and some volunteers answer the questions from these applicants and discuss all kinds of things about the camp. Besides, we have bought a service of accurate marketing through internet from a company.

TUM Graduate School 2.0: Introducing Automatism

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University-wide graduate schools as the general organizational framework for doctoral education have been basically absent in the German academic landscape for a long time. As one of the first German universities, Technische Universität München (TUM) established its TUM Graduate School (TUM-GS) in the framework of the German Excellence Initiative a few years ago. In a first step, our doctoral candidates (I avoid the term "students" here, since, even in the case of a structured program during doctoral education, the understanding of doctoral candidates is the one of employees or freelancers, but definitely not that of students) could choose: either becoming a member of one of the 24 different graduate centers and, thus, also a member of the umbrella organization TUM-GS, or doing an individual doctoral project outside any school organization scheme – which represents the traditional German way. By spring 2013, TUM-GS had roughly 2,200 doctoral candidates from all departments as members, together representing roughly one third of all those striving for a doctoral degree from TUM.

From the very beginning, the major concern of quality management and of tracking the candidates' progress was the role of the so-called "external" candidates – i.e., doctoral candidates without a formal TUM affiliation. While such a lack of affiliation might sound strange in an academic system with established graduate schools, it is quite widespread in Germany, for various reasons. In the engineering sciences, e.g., it is a well-established (and fruitful for all) practice that master-level graduates join an R&D department of a (typically larger) company after their master's degree to pursue a doctoral degree there. They work in the company, are paid by the company, get some free time for their research by the company, and are (sometimes in a very collaborative way, sometimes more or less formally only) supervised by a professor at the university. Or others join a non-university research institution after their master's degree, such as a Helmholtz, Leibniz, Max Planck, or Fraunhofer institute (the first being roughly comparable to the National labs in the U.S.), with a contract and presence there, but again with the doctoral degree coming from the university. A third, but not last, group of externals are candidates in fields such as architecture, who frequently have to organize their own non-university money (via a scholarship, or by working elsewhere) while doing their doctoral research.

Although such an external model has some advantages (close links to other institutions, especially industry, or a maybe stronger practice-orientation), there are also obvious drawbacks: a missing emotional affiliation with the academic institution issuing the doctoral certificate, a missing embedding into the university's research environment (which also means missed chances frequently), and a basically impossible tracking of progress for the university in many of those cases. Actually, just trying to get a precise answer to the question "Who is and how many are working for a doctoral degree with us?" was hardly possible at

TUM. A personal case: One of my former master's students joined Daimler research after graduation – a really excellent researcher, whose qualities were also detected by his new industry environment, of course – and used for other purposes. As a result, there has been a contact just once a year so far, with discussions on what to do next – but neither me nor probably he himself would be able to declare whether, after six years, this is still an active endeavor.

Hence, we intended to introduce a mandatory TUM-GS membership at least for all our external doctoral candidates, i.e., all those without a direct TUM affiliation. However, this did not work for legal reasons – our legal department clearly said "if mandatory then for all." This was the birth of an obligatory, or maybe less frightening, automatic membership of all doctoral candidates at TUM in TUM-GS. As of January 1, 2014, all doctoral candidates (across all the different titles such as those from science (Dr.rer.nat.), engineering (Dr.-Ing.), or even medicine (Dr.med.)) will become a member of TUM-GS as soon as their application has been formally approved. A couple of rules will hold for all of them (participation in a kick-off seminar; a minimum membership of two years; an active integration into TUM's academic life; a discourse with the scientific community, typically via talks, conferences, or publications; and a small amount of coursework, which can also be seminars etc.). Following a clear subsidiary strategy, the concrete implementation of the above as well as any additional regulations are to be fixed by each of the 24 so-called graduate centers individually (one for each department plus a couple of cross-departmental ones).

Concerning the tracking of candidate progress by TUM-GS, the following instruments have been established:

- a mentoring agreement to be signed at the beginning by the candidate, the advisor, and the respective graduate center's representative, with a research plan;
- an annual re-registration by the candidate, to be confirmed by the advisor, with an update of the research plan;
- the tracking of the records by TUM-GS office.

The latter will be done via an IT solution currently derived from our student life-cycle management tool – which is a must due to the expected increase of TUM-GS members by a factor of two to three.

Hence, there will be use of technology for tracking the progress of our doctoral candidates. However, the current emphasis is also on getting a smooth transition to and a high level of acceptance of the new and mandatory TUM-GS.

ProDoc – A Progress Tracking System for Graduate Students

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A recent report[1] of the Dutch 'Rathenau Institute'[2] is devoted to academic careers and measures taken to influence those careers. In this report the percentage of graduate students who—ultimately—obtain a PhD degree is found to vary between 72 and 76% in recent years. The mean time it takes these students to finish their thesis ranges from 4.5 to 6.2 years—depending on their research domain—with 5.5 years being the average. Moreover, it was found that only 57% of our graduate student population originates from the Netherlands itself and that 70% of the graduate students pursue a career outside academia after completing their PhD.

From these numbers we conclude that graduate education in the Netherlands is highly international—which is good—but suffers from relatively high drop-out rates of typically 25%, and the time needed to degree completion overshoots the nominally available four years by almost 40%. With more and more PhD positions funded through the EU, which provides three-year fellowships, the problem of exceeding nominal degree completion times becomes apparent. In order not to frustrate young researchers, or – even worse – shy them away from graduate education altogether because long periods without payment (and no degree yet) may loom ahead of them, measures need to be taken.

At the University of Twente a new online doctoral monitoring system is being developed —ProDoc—that is aimed at mitigating these problems. The first aim of the system is to get the numbers right. Historically, every professor in the Netherlands has the so-called ius promovendi, the right to act as supervisor of graduate students he/she finds suitable to pursue a piece of research that may lead to a doctorate. In the past this led to vague non-recorded agreements between PhD students and supervisors. On the basis of such agreements it is not even possible to evaluate numbers as quoted in the first paragraph of this paper. Hence, by insisting that all PhD students, whether they are university employees or are supported by a funding agency or industry, whether they receive a fellowship or not, or whether they conduct research for their own curiosity (and at their own cost) or on the basis of a well-described project, they all should be treated equally, and be registered and monitored properly. Only by getting the numbers right can we start to optimize them!

The second purpose of the ProDoc system is to assist in and improve upon the supervision of graduate students and hence contribute to the quality assurance of the third (PhD) cycle. Once the PhD student has been registered in ProDoc the supervisor and student are invited to write a Training and Supervision Plan. In this plan an outline is given of the research that will form

1 M. de Goede, R. Belder and J. de Jonge, Feiten & Cijfers 2013: Academische carrières en loopbaanbeleid (in Dutch, www.rathenau.nl).
2 The Rathenau Institute was founded in 1986 by the Ministry of Education, Culture and Science with the purpose of carrying out assessments of the science system in the Netherlands.

the basis of the PhD thesis and a preliminary list of courses and workshops is given that will be followed by the student to increase his/her in-depth knowledge of the subject and develop the global skills he/she needs to acquire. Each graduate student is asked to include 30 ECTS (European Credit Transfer System points) of educational activities in his/her Training and Supervision Plan.

It rarely happens that the research plan made at the beginning of a PhD project remains unchanged. Hence, the ProDoc system allows for (and asks for) a yearly update of the Training and Supervision Plan in annual assessment meetings. In this way the progress of the student—both in terms of research output and educational activities—is frequently monitored and measures can be taken if progress is lacking. At the same time, the global skills courses selected by student and supervisor can help in addressing problems the student might experience while conducting his/her research. Examples include courses in academic writing, presentation techniques, and research management.

In the Netherlands it is customary to first complete a master degree (in Science) before starting with a four-year PhD program. Given the growing importance of EU-funded projects, the international competition, and the fact that 70% of our graduate students proceed with a career in industry for which it is desirable to be less than 30 years old, the University of Twente is now also offering 2+3 programs for a combined MSc and PhD track. The ProDoc system is also supporting such programs, although it should be noted that for practical reasons courses taken during the MSc phase are registered in the large university-wide bachelor-master educational support system (OSIRIS).

Whether a student is enrolled in such a combined 2+3 program or as a four-year PhD student, in both cases an essential assessment is organized before the end of the first year of the PhD program. Every PhD student is asked to present his/her initial results and plans for the future during a Qualifier Exam, the result of which—in the form of a go/no-go decision with an optional 3-months improvement period—is registered in ProDoc. The Qualifier may initially lead to an increase of the drop-out rate in the first PhD year, but will certainly prevent extremely frustrating cases (for both student and supervisor) where after 3-4 years it is only concluded that a PhD thesis is not feasible.

The implementation of the ProDoc system[3] at the University of Twente is presently in progress. While preparing the implementation it was realized that it is insufficient to develop an online registration and monitoring system while not—at the same time—also changing the official regulations for PhD students at the university. For the historical reasons mentioned above, the legal basis for a PhD defense in the Netherlands was largely limited to a set of rules describing the procedure that needs to be followed once a concept manuscript for a PhD thesis is available. This is in sharp contrast to the bachelor and master programs, which are regulated both by law and internal university regulations to a fairly large extent. The importance of such regulations stems from the need to create a level playing field for all students, the desire to avoid law suits in case educational decisions are disputed and the wish to improve the overall quality of third cycle university education. While rolling out ProDoc we found out that it is crucial that there is full consistency between the regulations for PhD students and the way that these rules are implemented in the system. For that reason a simultaneous plan was initiated to write—and get approved—a so-called PhD Charter, a document describing the rules and obligations of all PhD students and supervisors. Moreover, the previously existing Doctorate Regulations—describing the set of rules applying to the

3 ProDoc is a custom made application of a generic educational information system developed by PeopleXS.

PhD thesis and the PhD defense—needed to be modified as well in order to ensure that a consistent set of regulations became available. Both the new PhD Charter and the modified Doctorate Regulations were just recently approved by the Executive Board of our university and are expected to be effective as of 1 January 2014.

It is too early to be able to assess the effect of the introduction of ProDoc at the University of Twente and all associated measures described in this paper. Still, at the qualitative level we can observe individual groups experimenting with the registration of educational activities, 2+3 MSc-PhD programs, non-official qualifiers, etc. For that reason we are hopeful that the first effects on the time needed for degree completion will become visible already in the coming years.

Acknowledgement

We are grateful to Clemens Pouw and Petra de Weerd-Nederhof who—respectively as initial and present director of the Twente Graduate School—have crucially contributed to the concepts described in this paper.

The European University Institute's Exit Survey

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Introduction

Our first survey was organized in 1986 with the objective of setting up an Alumni organization of European University Institute (EUI) PhDs. Ever since then we have organised exit surveys on a regular basis and with increasing frequency. Not only has frequency changed—currently we launch one every 3 years—but also the survey's objectives. From an inventory of our Alumni network it has slowly become a major instrument to improve content, structure and the quality of our doctoral education. Today it plays a key role in attracting top PhD candidates based on our placement record in top universities.

Our first survey was a basic questionnaire with information on career and position occupied in the years after leaving the EUI, but soon we elaborated the list of questions to include feedback on the programme and quality of the supervision received at the EUI. What was lacking was a comparative dimension, since Europe, with the exception of the U.K., was at that time a desert as regards doctoral statistics - not only as regards the alumni careers of PhDs but also as regards total numbers, completion rates and time-to-degree. As a result the 2006 survey was based on a new questionnaire which was developed in cooperation with a large, nation-wide project covering American graduate education, set up by CIRGE (the Center of Innovative Research in Graduate Education), which organizes five and 10 year exit surveys in various disciplines funded by the Carnegie Foundation and the National Science Foundation. This allows us to put our survey in the context of the American data.

At that time the Institute—at least in Europe—was the vanguard of this exercise; in this respect the Institute took an active role in developing a report which was published by the European University Association in cooperation with UK-GRAD (now VITAE). One of the main conclusions of the European University Institute's Association working group on career developments was that the survey should become a regular instrument in order to evaluate and improve doctoral programmes. Another recommendation of the working group was that a frequency of five years seems to be more appropriate than 10 years. To keep the surveys operational it is very important that an active link is kept with the PhD students at the start of their career. That link is preferably in the hands of the departments—in other words, it would be advisable that within the departments an effort be made to follow up on the development of the students during the first five years after leaving the Institute in order to obtain detailed information about this period. In fact, the department is the first contact for students starting their careers, since frequent requests for reference letters will be addressed to the department or its academic staff.

The increased frequency is enormously facilitated by the introduction of the Internet. Where our first survey was based on "stamped addressed" envelopes, today various programmes like QuestionPro and SurveyMonkey make a real difference. So much so that we had to revise

our questionnaire, shorten it considerably, because of "survey fatigue" among the contacted subjects.

From most of the surveys carried out in the U.S., as well as from our own survey it was very clear that students did not consider themselves well prepared for the labour market, both in the academic and private sectors. In the light of these results, the Institute has taken active steps in organizing a career development group which, based on the first results of the last survey, tackles the areas for which we knew there was a good chance of our students starting their careers.

A programme was set up which consists of three elements:

a. Training of **teaching skills** (such as is already in place in quite a number of British universities)

b. Development of all other **generic academic skills**, such as research training, ethics and research, etc.

c. Teaching opportunities: a network in cooperation with our Alumni Association, offering **teaching opportunities** across Europe.

Another important part of preparing researchers for their future careers, also organized in cooperation with the Alumni Association, is our **career events** at the beginning of each academic year when alumni who are employed in the sectors to which most of our students go (international organizations; NGOs; international law and consultancy firms) inform and prepare the students better for careers in these areas.

3: Using Technology to Enhance Research and Scholarship

Expanding Access to Research and Scholarship

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Expanding access to research and scholarship has been viewed—and must be viewed—in terms of costs and benefits. At the same time, we cannot shape a full discussion without the question of responsibility for access. We begin this discussion with a framework provided in Willinsky's The Access Principle[1].

A commitment to the value and quality of research carries with it the responsibility to extend the circulation of such work as far as possible and ideally to all who are interested in it and all who might profit by it. (p. xii).

Examining this principle invariably leads to lively debate around issues of "who pays for what and when." While these discussions continue—deliberated with arguments of policy and advocacy—time, technology and the creativity of researchers and scholars move forward. The responsibility for access has now met the responsibility of preparing individuals and institutions for access. At all our institutions, it is likely safe to say, there are faculty leaders skilled in the use of technologies and methods supported by new technologies. And graduate students arrive already skilled. Their digital tools, methods, and skills are the touch points for this timely and, perhaps, increasingly urgent discussion on accessibility and responsibility.

This work, as well, shapes a new set of imperatives for institutions and academic leaders. We encourage faculty, scholars and researchers to go to the cutting edge, to the limits of imagination and beyond, in their work. How we work with them to arrange different and newly imagined workspaces, laboratories, and "collaboratories" are essential to their research and scholarly progress and to the preparation of our graduate students—the next generation of scholars and researchers. These spaces are not just where they work, but are also tools themselves, resources that help to create the new identities that emerge from their use of technology and that shape eventual access to their work.

The point here is that the accessibility discussion has moved forward and increased in its dimensionality. The dimensions of faculty development, preparation of graduate students, and the necessity of new shapes for work spaces have been added.

Some examples are described below from Emory University. These projects and programs have emerged from interest, creativity, and persistence—in the spirit of response and responsibility to the opportunities our scholars, researchers, faculty and graduate students provide.

1 Willinsky, John. The Access Principle: The Case for Open Access to Research and Scholarship, MIT Press, 2009.

The Emory Center for Digital Scholarship

The Emory Center for Digital Scholarship[2] (ECDS) is a new organizational umbrella designed to unify existing digital support services into a centralized resource for teaching and research. It provides "consultation and support for digital teaching, research, preservation, publishing and exhibiting." It has grown, in part, from Mellon Foundation funding to create new functional collaborations for librarians, faculty and graduate students.

Examples of projects produced by faculty and students aligned within ECDS include:

- Southern Spaces[3], a peer-reviewed, multimedia, interdisciplinary open-access journal published in collaboration with the Robert W. Woodruff Library

- Virtual Rome[4], created with faculty leaders in Art History, is a virtual, walkable experience of 17th century Rome based on Giovanni Battista Falda's detailed 1676 plan of Rome

- Lincoln Logarithms[5], uses digital tools to analyze 57 sermons delivered after the assassination of Lincoln and is produced in collaboration with the Pitts Theological Library and scholars in Candler School of Theology

From principles established in the Mellon Foundation supported project, Digital Scholarship Commons or DiSC, ECDS supports collaborative research, publishing and archival projects[6] that incorporate GIS mapping, digital literary analysis, visualization tools, video editing and electronic data. ECDS staff support faculty and students with training and expertise in instructional technology and digital assignments[7] (such as e-portfolios and digital stories).

ECDS is the outcome of several innovative programs and projects that advanced the use of new technologies at Emory and concurrently helped to frame discussions of access.

Overall, the goals of initiatives within ECDS can be viewed as institutional commitments to advance the digital environment for research and creative work and for how it is organized, more specifically by:

- changing the way 21st century digital scholarship is conceived;
- increasing opportunities for marketing and outreach through digital publishing;
- organizing new space and structures within libraries that support 21st century digital collaborations; and
- changing the ways that the next generation of scholars and librarians engages with research and the library.

Emory Center for Interactive Technology

Also within the umbrella of ECDS is the Emory Center for Interactive Teaching (ECIT)[8].

2 http://digitalscholarship.emory.edu/
3 http://digitalscholarship.emory.edu/projects/journal-southernspaces.html
4 http://digitalscholarship.emory.edu/projects/project-virtual-rome.html
5 http://digitalscholarship.emory.edu/projects/project-lincoln-logarithms.html
6 http://digitalscholarship.emory.edu/research/index.html
7 http://digitalscholarship.emory.edu/pedagogy/index.html
8 http://ecit.emory.edu/index.html

ECIT supports student training for digital media assignments and also works with faculty, staff and students to create other technology-enhanced materials. While the services here are dedicated to teaching and pedagogy, it is worth mentioning because of how it addresses current and emerging needs for faculty development and professional training for graduate students.

To stimulate and enhance connections between faculty and graduate students to prepare for contemporary teaching using new technologies, the Laney Graduate School funded and partnered with ECIT to support the three-year Technology, Pedagogy and Curriculum (TPC)[9] program. TPC was an initiative designed to empower Emory's graduate students with the knowledge of how to effectively use technologies such as wikis, blogs, digital video, iTunes and more in their own teaching. The program's goal was to build upon the resources available to graduate student instructors by giving them a sustained, concentrated introduction to instructional technology, focused upon their particular pedagogical goals. TPC was wildly successful in helping students to shift their perspectives on digital best practices and what is possible in the classroom through the use of technology.

The Voyages Project

As new information about slave voyages emerged in the late 90's, along with a surge in technological capacity, an historical project was born. Two years in the making at Emory, The Trans-Atlantic Slave Trade Database[10] provides searchable information on more than 35,000 slave voyages to the Americas between the 16th and 19th centuries, as well as maps, images and data on some individual Africans transported. The principal investigators for this astounding endeavor were Emory's now Professor Emeritus David Eltis (History) and Martin Halbert, formerly of the Digital Programs and Systems Division of the Woodruff Library.

The database is intentionally collaborative and can grow and change over time. The digital innovation and leadership of Emory University Libraries was pivotal in the design and launch of this application and continues to play an important role in deploying the database and providing instructions on how to navigate and understand it. It is an incredible example of interactive scholarly work that is also publicly accessible. And it is an example of technology enhanced research methods that have changed disciplinary engagements, collaborations, and discoveries.

Digital Components in the Dissertation and Thesis

The Laney Graduate School is also responding to technological advancements in student research and how they are included in the thesis or dissertation. In 2013, the Laney Graduate School established guidelines for the inclusion of video components in dissertations and theses.[11] The guidelines provide instructions for identifying a video as a component of a thesis or dissertation. They do not address the substantive issues of whether videos are acceptable components of dissertations, and if so, to what extent or in what roles. Those issues are at present determined by faculty in each program.

The guidelines are intended to ensure that video components of theses or dissertations posted in the Emory Electronic Theses and Dissertations (ETD) Repository are identified as such

9 http://ecit.emory.edu/index.html
10 http://www.slavevoyages.org/tast/index.faces
11 http://gs.emory.edu/academics/policies/completion.html

components. They provide for this identification inside of the video itself, in order to ensure that any video accessed through the ETD system will carry information about its origin, even if it is viewed by someone who has not seen the ETD entry or read relevant text parts of the thesis or dissertation.

In closing, we return to the beginning. Expanding access to research and scholarship must be viewed in terms of costs and benefits and be grounded in discussions about the responsibility of access. But we must also seize opportunities to nurture scholarship and research that pushes boundaries through the use of new technologies, tools and methods. Institutional responses will of course vary by needs and degrees of advancement, but it is clear that we have a part to play not only in responding through discussions of access and responsibility, but in supporting and developing the advancements we must now consider.

Access to Research and Scholarship: A View from South Africa's University of Johannesburg

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Information and Communication Technologies (ICTs) have become vital to international competitiveness, making fast and effective communication possible between countries and across continents and underpinning the global economy. In addition, high value ICTs and services themselves form part of an expanding network of international trade and commerce. They are the backbone of scientific and technological innovation, and research and publication. Building a knowledge economy, establishing strong and innovative research communities and centres of excellence, disseminating new knowledge and participating in the global information and research enterprise all depend on ICTs. Educationally, they are being used to deliver a diverse array of learning experiences.

ICTs are critical to Africa's long term growth. However, many southern African countries have gaps in ICT infrastructure and system deployment which hampers the promotion of research and scholarship. Some of these limitations are:

- Teaching and research staff have reasonable access to computers; students much less so. On average in the region there are 70 students per computer, falling far short of the target of five students per computer recommended for US universities.

- Inadequate and expensive bandwidth is a major challenge. While this is a fast-changing area, the African Tertiary Institutions Connectivity Survey (ATICS) found that institutions' bandwidth was "too little, too expensive and not well managed." The average amount of bandwidth has gone up, but none of the universities surveyed had close to 100 Mbps connectivity.

- Costs of connectivity have fallen almost 50% compared to 2011, but, though precise international comparisons are difficult, the cost per Mbps may be as much as 20 times higher in Southern Africa than it is in the U.S. or Europe.

- Enabling policies are necessary for effective utilisation of scarce resources. It is a concern that only half of the 66 the universities in the region report having an Acceptable Use Policy (AUP) in place, or have provided e-learning opportunities and training to their staff.

- Most significantly, there is little evidence of ICTs being used for advanced research. While most academics in the region utilize the internet for research, this is generally restricted to browsing for online information or accessing online journals. Higher level research enquiry such as accessing distant scientific infrastructure, for example, supercomputers, modelling and simulation equipment, large astronomical telescopes or grid computing, continues to be limited.

The need to increase the quantity and quality of scientific research output in Southern African higher education has been well documented. As Kotecha (2008) notes, "the tipping point for African research and innovation will not merely be the ability to fully access and use the new abundance of global knowledge and ideas, but to make an active and significant contribution to its creation." Most universities in Southern Africa assess research output by relying on bibliometric analyses of papers published and cited in international indices, such as ISI. From an African perspective, the conduct of research is highly concentrated, with three countries, Egypt, Nigeria and South Africa, collectively accounting for over 80% of total output of scientific research papers. Comparing research output between universities in the Southern African Development Community region, South Africa with the best and most extensive infrastructure in the region, ranks highly, accounting for 75% of its output. There is also an imbalance within South Africa, with a small number of high performing universities contributing to a large proportion of the research output. It is clear that the region needs to move beyond being a consumer to being a producer of knowledge. Investment in research infrastructure, including ICTs, is critical to this.

The University of Johannesburg (UJ) has positioned itself as leader in research that addresses the economic, social, political and technological aspirations of South Africa, in particular, and of Africa in general. It has invested in and mobilised vital human capital and advanced knowledge systems, and works closely with stakeholders such as those in industry and government.

A key aspect of UJ's vision and mission is to establish an ICT strategy which:

- supports up-to-date, flexible and accessible teaching and learning
- supports research that fulfils the demands of "supercomputing" required for advanced scientific and technological research
- enables effective management of information, communication and institutional business intelligence, and
- enhances the effective and efficient operation of administrative and support systems and of institutional governance.

A specific example relating to the promotion of research and scholarship is the establishment at UJ in 2012 of a new Centre for Academic Technologies (CAT), which aims to use contemporary learning theories to support deep learning and research. CAT utilises a number of software applications to support the development of academic writing, and allows researchers to download initial research software to gain access to software licence management systems. It is currently negotiating with Elsevier and Gradnet to deploy an electronic delivery platform for e-books. In the last seven years, UJ is estimated to have invested about US$ 6 million in the use of technology to enhance learning, research and scholarship. As part of its mission to achieve global stature, it has used international indices such as Incites, Scopus and Scival to assess its role in the global research arena, has applied for QS ranking, is a member of Universitas 21 and has entered into a number of research agreements with international partners. Notably, these include working with prestigious international laboratories such as CERN, the European Synchroton Radiation Facility, the Australian Nuclear Science and Technology Organisation, the ELETTRA Synchroton Facility (Italy), Institut Laue-Langevin, Grenoble (France), the ISIS Facility and Rutherford Appleton

Laboratory (UK).

In a developing country such as South Africa, and even more in the southern African region as a whole, access to technology is varied and uneven. In these contexts, considerable resources need to be invested to ensure optimal use of ICTs to promote research and scholarship of national relevance and global stature. The University of Johannesburg has moved decisively in this direction.

Finally, Morgan (2013), notes that while technology is a central feature of university life, its role is contested. Education, expertise, reading and thinking, and scholarship all matter, and what technology has provided is an infrastructure. Ultimately, it is social systems that give context and meaning, and universities have an important role in driving this discourse.

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The Centrality of Collaborative Online Tools to the Modern Scholar and the Commercial Sector's Appropriate Role in Creating Those Services

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At present, approximately half of the most popular websites in the world have as their primary mission either the discovering or sharing of information.[1] The vast majority of these sites were created by and are maintained by for-profit interests. Academics are among the masses whose online expectations are being set by the products of companies such as Google (receiving more than one billion queries per day)[2], Facebook (utilized by 700 million users per day)[3], and countless start-ups that often quickly fall by the wayside or never receive significant name recognition. It is in the context of these modern web-companies that the groundwork has been laid for what could be the fastest rate of improvement ever seen in scholarly collaboration.[4,5]

One could imagine an environment in which all of the world's most popular websites and services for sharing and discovering information would not be commercial, and in fact some individuals, including some prominent faculty and some of the world's technical experts on big data, advocate for just such an approach.[6,7,8] But the challenges to doing so extend beyond the daunting perspective of raising capital. In this approach, a clear mission that can properly be overseen by a non-commercial interest may often be in conflict with operational behavior that is driven by the cold reality of the financial models needed to support the service. Importantly and often forgotten, the long-term maintenance of a web service—one that must continue to innovate or become irrelevant—is more substantial than ever.[9] As a result, the majority of the most successful new projects focusing on web-based scholarly communication require foundation (e.g. Zotero[10]), government (e.g. VIVO[11,12]), or venture capital (e.g. Academia.edu[13] and ResearchGate[14]) support to get off the ground and remain financially viable while they build a sustainable model. Over time, they all require

1 Alexa Top 500 Global sites http://www.alexa.com/topsites
2 Google Gets 1 Billion Visitors http://www.thedailybeast.com/cheats/2011/06/21/google-gets-1-billion-visitors.html
3 Facebook's Q2: Monthly Users Up 21% YOY TechCrunch posting, July 14, 2013 http://techcrunch.com/2013/07/24/facebook-growth-2/
4 The (Coming) Social Media Revolution in the Academy, Jessie Daniels and Joe R. Feagin, Fast Capitalism, Issue 8.2., 2011
5 Will Reference Books and Journals Survive? A Debate, The Scholarly Kitchen, Kent Anderson, February 3, 2011
6 Pete Warden Blog Post "Why we need an open-source geocoding alternative to Google" http://petewarden.com/2011/10/27/what-can-you-use-for-geocoding-instead-of-google-maps/
7 Information Wants to be Free: Intellectual Property and the Mythologies of Control, Essay by R. Polk Wagner https://www.law.upenn.edu/fac/pwagner/wagner.control.pdf
8 Open Source alternatives to Google, Linux Today, Matt Hartley, February 7, 2011
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10 Zotero Project Official Blog, Wednesday, January 6, 2010
11 VIVO Project Official Website http://www.vivoweb.org/blog/2010/10/usda-agencies-join-vivo
12 VIVO Project Official Website http://vivoweb.org/about
13 Tech Crunch "In The Studio," Academia.edu's Richard Price Is A Founder On A Mission," January 24, 2013
14 Venture Village June 24, 2013 "Facebook for scientists" ResearchGate confirms $35m new funding led by Bill Gates and Tenaya Capital

universities to make financial commitments to them in order for them to be sustained, whether it is via memberships or subscriptions, blurring the differences between non-commercial and commercial ventures.

Many new collaborative tools aimed at scholars combine content that is under copyright along with newly created content. Although there are pockets of open information, most of the highly desired content is the restricted intellectual property of those who produced it. Publishers like ProQuest undertake the work of negotiating with the rights holders to package and market content in the manner that will be most optimal for the scholar and content producer. While the Open Access movement is gaining momentum in academia (with more than 8,000 open access journals in existence and growing government support for open access to the content produced by research funded by government grants[15]), researchers want a single point of access that encompasses open and proprietary content. There are other data types to consider, including raw research results and biographical data—both of which may need to be licensed from the rights holder. At ProQuest, we see an emerging role in serving the scholarly community by marrying these varied sources of content and supporting it with tools that foster collaboration. Among our focus areas are meeting user expectations and embracing new opportunities brought by the online environment.

Meeting Users' Expectations: Today's websites must be easy to use, stocked with instantly updated data and have minimal barriers of access. Further, they must be supported by steady investment that enables the service to evolve with user expectations. Pivot, a web-based resource that identifies active sources of funding and matches them with researchers in one step, is a prime example of building an intuitive web portal that combines public and private data to create a unique service for researchers. The service is continually updated and enhanced to respond to user feedback. For example, the service's "recommender service" initially met with acclaim for its ability to identify the best funding opportunities for the institution and then match them with researchers and collaborators. However, user feedback pointed to an opportunity to increase the precision of the recommender service with facets, ultimately enabling the university research office to tune Pivot more finely to their environment and make it easier to win grants and awards.[16] Pivot is not an isolated example; when ProQuest creates a new web product, it puts forward a five year plan for the resources, knowing that a changing web landscape will render certain aspects of the site outmoded during the initial five year term. This planned investment works in concert with collaboration with the users and scholars. The ProQuest model of learn-prototype-pilot-experiment-iterate is supported by a decades-long partnership with scholars, enabling us to hone services that evolve with their needs. For example, in the case of the Pivot recommender service, its base is three million pre-populated scholar profiles that have been curated by ProQuest over many years of working with scholars and is now matched with public information.

Embracing New Opportunities: Through the advent of sites like figshare, which allow collaboration on content creation and sharing data sets, there is reason to be optimistic that the end result will be a stronger and more inclusive academic community with new tools and flexibility to address our world's largest challenges. As these concepts have been put into practice, the methods of science and principles of academia have been challenged to adapt. Academia has stepped into this new era of networked collaborative research[17] to support a new environment of larger, more globally dispersed teams of researchers. At ProQuest, we are

15 "Open Access to Research Can Save Lives", Chronicle of Higher Education, December 3, 2012

16 ProQuest Press Release, "ProQuest Tunes Up the Precision of Pivot™ to Make Winning University Research Grants More Efficient" August 15, 2013

17 http://www.bwfund.org/career-tools/thriving-era-team-science

facilitating collaboration and sharing through the new service RefWorks Flow. This workflow tool builds on the pioneering RefWorks suite of citation management services, expanding it to address two significant needs of researchers: first, a collaborative work environment and second, a secure, easy to access a "personalized library" to house research articles, notes, etc. In simplest terms, RefWorks Flow collects, manages and organizes research papers and documents, aiding collaboration with friends or colleagues by sharing collections of articles. Reading articles from the researcher's library as well as annotating can be done collaboratively as part of Flow, while still maintaining the RefWorks bibliographic strength that has been part of the resource since its inception. The broader impact of the service is its ability to streamline research by removing barriers to collaboration. Time to complete research is reduced and the path to new findings and insights is shorter, enabling institutions and researchers to be more productive in an increasingly competitive global environment.

The impacts of this tectonic shift on the way that scholarship is conducted is still playing out, but its effects can already be felt at the universities seeking to increase collaboration via the redefinition of tools, increased access to library information, and greater sharing. ProQuest looks forward to continuing to create tools and resources that combine content from a rich and varied set of sources and that further enhance scholarly research and collaboration.

Assessing Research Quality and Impact at Cornell University

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Cornell University's Strategic Plan

> "puts forth an overarching aspiration for the university: **to be widely recognized as a top-ten research university in the world**, and a model university for the interweaving of liberal education and fundamental knowledge with practical education and impact on societal and world problems."[1]

In addition to deploying the comprehensive set of resources required to enable the university to attain and maintain such a position (top ten), university leaders must also identify and agree on what it means to be "top ten" (what definitions and criteria are to be used) and to agree on how we will measure progress toward this aspiration (what evidence is to be used). Research assessment tools enabled through technology may help in these efforts.

Evaluation and assessment wisdom across diverse fields has commonly purported that you can't improve (or change) what you can't measure. More broadly, this can be recast as you can't improve what you can't observe; i.e., unless you observe an activity, outcome, or impact, you won't know if you are doing better or worse in relation to your goals for that element. This implies that both quantitative and qualitative tools and data may be useful in assessing university research quality and impact.

Technology-enabled Tools to Assess Research Outputs at Cornell University

Technology-enabled tools useful for assessing research outputs focus on providing and organizing both quantitative and qualitative information, from internal and external sources. External sources may include publicly-available as well as private (commercial/purchased) data and tools from specialized vendors. Internal data may derive from all levels of the university (department, college, or university-wide), posing aggregation and interpretation challenges when systems and definitions across these levels differ.

Examples of quantitative data and tools used to assess research activity, outputs, and impact include a variety of internal institutional data represented visually and manipulated easily by users across the university (e.g., through the use of Tableau data visualization and analytics software), and the use of various publicly-available and privately-purchased ranking schemes, such as Times Higher Education World University Rankings (which I won't address here) and Academic Analytics LLC. Cornell University Graduate School use of Tableau for interactive maps and charts was featured in a Wall Street Journal blog.[2]

At Cornell, we have found useful the research productivity business intelligence data

1 http://www.cornell.edu/strategicplan/
2 http://blogs.wsj.com/cio/2012/07/05/cornell-graduate-school-harnesses-data-visualization/

purchased through Academic Analytics, LLC,[3] which allows comparisons by academic department, doctoral program, broad disciplinary grouping, and university, and provides comparative data on such aggregate and per capita research indicators as total grant dollars, total number of grants, number of faculty members with a grant, dollars per grant, grant dollars per faculty member, percentage of faculty with a grant, and similar measures (aggregate and per capita) for published articles, citations, and honorific awards received by faculty. Such comprehensive as well as granular data allow analysis regarding the various "levers" that can be manipulated through incentives and disincentives to guide faculty behavior and activity in ways that could stimulate greater research productivity and impact, at least on these measures, and toward goals that are realistic and likely achievable as determined by benchmarking each element against logical peer institutions' performance.

An example of technology-enabled qualitative research productivity information is the electronic database of research impact statements curated by the College of Agriculture and Life Sciences at Cornell.[4] Every year, every faculty member is encouraged to submit one or more "impact statements," each providing a descriptive summary of a research program (an integrated set of research projects over time), the societal or knowledge issue or problem the research addresses, the response and impact resulting from the research, and the funding, researchers, and organizations involved over time.

Cornell also uses VIVO, an open source "research-focused discovery tool that enables collaboration among researchers across all disciplines."[5] Mapping tools through VIVO provide characterizations of activity (publications) and collaborations across disciplines and units, providing insights into disciplinary and cross-disciplinary research activity and impact.

Benefits and Limitations of Metrics to Assess the Nature and Quality of Research Outputs

Cornell's Strategic Plan provides some guidance for thinking about indicators to assess progress (see Appendix D of the Plan); this guidance is applicable to assessing progress on research goals. The authors cautioned about the difficulty of developing "fully adequate measures of progress toward greater excellence … No particular metrics or qualitative indicators will be sufficient, but some sets of combinations of them will be significantly better for tracking progress than others or than having none." This last caution is important —faculty, particularly in some disciplines, will inevitably argue that the aggregate and/or per capita measures available for their program are incomplete, inadequate, or inaccurate. University leaders might then challenge these critics to propose their own suggestions about the type of information that would be more relevant to evaluate the research productivity and impact of their "unique" research program, and be willing to accept (or at least discuss) the types of observational data or metrics suggested by those faculty. To be widely adopted and integrated into the behavior of a graduate program or academic department, quantitative metrics and qualitative indicators should be developed in consultation with those working in the areas being measured—i.e., faculty for research programs. In addition, it is important to recognize another truism from the evaluation literature—you will become what you measure. Metrics and indicators can help to promote improvement by holding individuals or units accountable for more or higher-value research activity, but they also can be detrimental if

3 http://www.academicanalytics.com/
4 http://impact.cals.cornell.edu/project/100-years-changing-coastlines-nynj-harbor-birds-eye-view
5 http://vivo.cornell.edu/

attention focuses instead on achieving a particular measure rather than on the larger purposes of increasing overall research impact.

Quality Assurance Practices at the National University of Singapore

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The National University of Singapore (NUS) has transformed itself from a predominantly teaching institution to a research intensive institution over the past two decades. To align itself with leading universities globally, there has been a significant change in emphasis from quantity to quality of research. Several key initiatives have contributed to the success of this transformation.

Visiting Committees

Since 1999, NUS has mandated every academic department to form a Visiting Committee (that comprises two to four internationally renowned scholars in the field) to assess the progress made by the academic department. This exercise would be carried out every four to five years. As part of this review, the Visiting Committee can comment on the quality of publications outlets (i.e., journals and conferences) pursued by the academic department as well as draw the attention of the academic department to high quality publications outlets if these have been omitted.

Journal Tiering Exercise

In 2002, NUS conducted an extensive journal tiering exercise, where every academic department was asked to place all journals in its field into one of four tiers (premium, leading, reputable, and others). The set of premium journals would comprise the top 5%, the set of leading journals would comprise the next 10%, the set of reputable journals would comprise the next 25%, and the set of other journals would comprise the remaining 60%. This journal tiering list would then be verified by the Visiting Committee of the academic department. Following verification by the Visiting Committee, faculty members in the academic department would be strongly encouraged to target their work at top tier journals. For those disciplines where conference publications are important, a subsequent exercise was carried out to identify a list of top tier conferences where faculty members can target their work.

Promotion and Tenure System

A rigorous evaluation system for promotion and tenure has been in place since 2002. To gain promotion, a faculty member has to demonstrate a peak of excellence in one area of scholarship (research or teaching) and have an acceptable performance in the other area. To emphasize quality over quantity of research, a faculty member is required to include only five of their best publications in the promotion and tenure package. In addition, a faculty member can include pertinent details such as editorial board memberships of top tier journals, program committee memberships of top tier conferences, patents, citations, H-index, international awards, invited talks, research grants, etc. A panel of international reviewers

would then assess the faculty member. In recent years, a system of academic mentorship has been put in place where senior faculty members (mentors) would guide junior faculty members (mentees) to help them advance their careers along a desired path through pursuit of quality research.

Using Technology to Reinforce Initiatives

In 2000, NUS started ScholarBank@NUS, a repository to consolidate the research outputs of the community of faculty members, graduate students, and other researchers. This system seeks to harness the intellectual capital of the community by making the research outputs visible globally through open access to facilitate research collaboration. To date, this repository has more than 23,000 theses (doctoral and masters), patents, and papers authored by faculty members.

NUS has developed in-house databases to capture pertinent information about faculty members such as journal publications (classified by tiers), conference publications (classified by tiers), books and book chapters, patents and commercialization outcomes, editorial board memberships of journals (classified by tiers), program committee memberships of conferences (classified by tiers), awards (international or local), invited talks (international or local), and research grants (sources and amounts).

Beyond internal resources, NUS subscribes to major publication databases such as SCOPUS and ISI Web of Knowledge. Leveraging on these publication databases, the bibliometrics and other information have been elicited to generate insights into emerging research areas (e.g., Essential Science Indicators, a web-based tool available through ISI Web of Knowledge, enables faculty members to track research trends in their respective disciplines and identify promising research topics and prospective research partners should faculty members decide to embark on these research topics).

Prior to an evaluation by the Visiting Committee, an academic department has to prepare a self-assessment report. The in-house databases and external publications databases have been useful for this purpose. These resources allow an academic department to quickly compile a list of high impact accomplishments for the Visiting Committee. These resources also enable an academic department to justify their list of premium and leading journals (e.g., using impact factor for the journals) as well as explain why they are embarking on certain research directions (e.g., using the trends identified that matches their core competencies). It is possible for an academic department to use chronological information to demonstrate their progress over time.

When preparing their promotion and tenure packages (or undergoing annual performance review exercises), the in-house databases and external publications databases have facilitated the efforts of faculty members by allowing them to quickly bring together all pertinent information. Also, faculty members can use external publications databases to help them justify the list of proposed international reviewers. These resources have helped NUS to institute a rigorous performance evaluation system without making the efforts required of faculty members onerous (so as not to unnecessarily take their time away from productive work).

The use of bibliometrics and other metrics is not without limitations. SCOPUS and ISI Web of Knowledge do not differentiate their collection of publications according to journal quality.

The impact factor of journals does not necessarily indicate journal quality. To date, databases for conference publications tend to be incomplete. Yet, performance in some academic disciplines may be better assessed using conference publications, patents, creative works, etc. Because of these limitations of bibliometrics and other metrics, NUS has been using a holistic approach to evaluating academic departments and faculty members in its effort to enhance research outputs.

4: Online Graduate Education: Curricular Innovations

Innovations in Online Program Delivery: Who are the Drivers?

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Good practices in online curricular innovations for doctoral programs are more likely to occur when the innovation is not solely driven by the emergence of new technologies. Indeed curricular innovations, whether on or offline, are a consequence of a number of factors including the changing profile of students, the internationalisation of research and doctoral programs, and accompanying shifts in understandings and practices to do with doctoral education. It is also useful to locate any discussion of good practices of online program delivery on the fact that online programs has been developing over decades, and that shifts and changes have been incremental ones, until, arguably, the emergence of MOOCs. Importantly though the curriculum implications and the cost challenges of MOOCs have yet to be understood, let alone resolved.

Online program delivery can refer to various aspects of doctoral education – from the delivery of disciplinary content, to supervisor practices, to online student communities through social networking technologies, to online researcher development resources, etc.

Some key inter-related challenges that curriculum innovations need to take account of include:

- quality of supervision practices;
- the high cost of doctoral education to the university;
- the high percentage of students who work in full time jobs and study part-time as well as full-time student who work to top up their relatively small stipends that are attached to scholarships;
- the frequently experienced isolation of doctoral students.

At the University of Technology, Sydney (UTS) a recent curriculum innovation has been the design of a Framework for Doctoral Education. A key ongoing question, and arguably a challenge, is how this Framework works with the emergence of innovative online delivery platforms. The UTS Framework is underpinned by a number of principles, including importantly the idea that doctoral education has a dual purpose: advancing knowledge plus development of a researcher. The Framework has therefore been designed to provide more structure and support for the growing doctoral student population where the profile is changing substantially. International student numbers are growing, and both international and domestic students are entering with more diverse cultural, professional and educational backgrounds. Key features of the Framework are:

- the integration of formal and informal coursework covering discipline content, research methodologies and professional skills;
- increased formal assessments – one to confirm candidature, the second to confirm

advanced progress and the third to assess readiness to submit thesis;
- each student has a doctoral study plan, which is individually designed and negotiated through ongoing consultation between supervisors and students;

    - the doctoral study plan has a number of elements that are intended to describe the attributes of a high quality researcher, such as: to be a responsible and ethical researcher
    - research independently and in teams
    - plan and organise project/s
    - develop research skills and knowledge
    - communicate research to various audiences.

A feature of the Framework is that students' study plans can draw on a number of existing online resources. One key resource in terms of learning Research Methods and Professional/ Transferable skills is the e-Grad School. The e-Grad School was developed by the Australian Technology Network, an alignment of universities of which UTS belongs. The key users are doctoral students and no fees are required for the two non-award courses: Learning Employment Aptitudes Program (8 modules) and Modules Online for Research Education (6 modules). Two fee-paying award courses are also available: Graduate Certificate in Research Commercialisation (4 units) and the Master of Research Management and Commercialisation (12 units).

In addition, UTS is a member of a consortium of Australian and New Zealand universities, that established fIRST, an online website that provides online doctoral supervisor development resources.

In terms of coursework, at UTS there is an increased amount of activity, mainly face-to-face but also online that comprises discipline area and research method modules at the local level and professional/transferrable skills centrally. It is a combination of department, research centre/strength and central activities. The local is still a powerful source of knowledge and training opportunities.

While UTS has a made a decision not to ignore the MOOCs opportunities, at the same time, at this stage the university has decided not to fully embrace MOOC courses. There are a number of reasons for this. Firstly, UTS has made a major financial investment in new campus buildings. It is an inner city campus and while moving away from large lectures, it is constructing the campus as a campus 'to be in'. Also in terms of doctoral education the university is making particular choices about where to allocate doctoral resources, and the current focus is on supporting student travel to conferences, equity grants, topping up stipend scholarships, etc.

Nevertheless potentially MOOCs are likely to open up access to 'areas of knowledge', experts and large groups of peers, for students who are not able to come to campus. Like some other online classes, it can provide good virtual company, and may well be supported by high quality digital production. International doctoral students want 'real' company, but they also want access to content anywhere anytime. Nevertheless there are concerns by some about the quality of the pedagogy in MOOC offerings. In addition, "whether massive open online courses are the approach that will win out and bring real change is not clear" (NYTimes 18 Aug 2013). Currently the discussions are driven by business plan questions, and questions about whether or not MOOCs are transforming universities. Educators need to

have a more prominent place in these discussions; after all quality lies within the pedagogy. Meanwhile though, it is likely that increasingly doctoral applicants will include completion of MOOC modules and courses in their applications and furthermore doctoral students will increasingly seek 'content' through MOOC offerings. So a key challenge for universities is how to position themselves in an online world when they are not the only drivers in the uptake of innovative online programs. Students will be key drivers.

Innovations in Online Delivery: Benefits and Challenges

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Technology-enabled learning has grown considerably over the past decade and many would argue that digital technologies have transformed (or will transform) education. Advances in communication systems, inquiry-based networking and public access to Massive Open Online Courses (MOOCs) paired with economic and social pressures are in many ways reshaping the delivery of post-secondary education. The impact has primarily been felt at the undergraduate level, though recent reports out of the United States make it quite clear that this is not just an undergraduate phenomenon.[1] Over 45% of institutions offering face-to-face Master's programs also offer Master's programs online.[2] Comparative Canadian data could not be found, although a scan of online graduate credentials offered by member institutions of the Association of Universities and Colleges of Canada provides an extensive list of options. The trend is expected to increase as provincial governments weigh-in on the importance and value of online delivery and university administrators consider it as integral to their institution's strategic mission. Indeed the evidence indicates that students who are academically well-prepared and highly motivated to learn are best suited to benefit from online learning[3] —graduate students exemplify these characteristics.

Paradigm shifts are often contemplated at times of financial constraint or uncertainty. We have all heard it said that online delivery translates into cost-savings compared to face-to-face in part because it can be scaled to accommodate more students and requires limited physical resources. What is not typically factored in are the development, design, infrastructure and maintenance costs which are not insignificant, particularly if the effort is largely at the local level rather than an institutional initiative. Institutional commitment to the development of online options for courses and programs enables enterprise-wide economies of scale in acquiring technological infrastructure and support services, but perhaps more importantly, it provides a clear educational directive behind the need for change consistent with the mission and strategic vision of the university.[4] The latter emphasizes the pedagogical and social benefits apart from any economic benefit that may be experienced.

In the last two years at Queen's University, 75% of the new graduate programs approved are online or blended (hybrid), the latter incorporating an initial one week on campus experience. The primary reasons for adopting the online delivery paradigm were: i) to target adult-learners who can draw from their professional experience and who require flexible learning options to accommodate work schedules, and/or ii) to extend the reach of the programs to a broad-based clientele from around the globe to promote diversity in learning and perspective. Implicit is the underpinning of a sound business case that supports the need

1 McClintock, C., Benoit, J., & Mageean, D. (2013) Online Graduate Education. Council of Graduate Schools: Author.
2 Allen, I.E. & Seaman, J. (2005). Growing by degrees: Online education in the United States, 2005. Newburyport, MA: The Sloan Consortium.
3 Carey, T. & Trick, D. (2013) How online learning affects productivity, cost and quality in higher education: an environmental scan and review of the literature. Higher Education Quality Council of Ontario.
4 Graham, C.R., Woodfield, W., & Harrison, J. B. (2013) A framework for institutional adoption and implementation of blended learning in higher education. Internet & Higher Education 18:4-14.

for a given program including a cost analysis for development and delivery as well as the net revenue generation potential. To provide a high quality and desirable product requires broad consultation with prospective stakeholders (future students, employers and professional associations as appropriate). In our experience this was essential to ensure alignment of learning outcomes with identified needs; the result being highly marketable programs with economic relevance and an added benefit of securing a target audience who have already bought in to the product prior to launch.

Decisions to adopt a blended or hybrid model were based on evaluation of the value-added and benefit in terms of optimizing learning. Specifically, programs that introduced a one week intensive, on campus residential component did so to provide opportunities for active learning exercises, practical sessions and formal/informal engagement among students and instructors. Interestingly, these programs were all interdisciplinary, professional programs for which it was considered important that the cohort gained a shared understanding of the professional backgrounds of the participants, the particular interests that the various professions/industries targeted by the graduate program brought to the table and their unique approaches to addressing practical issues. Participants report that this insight enhanced their interdisciplinary, interprofessional learning by broadening their awareness and perspective contributing to a high degree of program satisfaction. Arguably a similar outcome may have been achieved absent the residential component; however, its inclusion was based on sound rationale, the desired result was attained, hence there is no plan for a head-to-head comparison.

The introduction of online or blended programs is not without controversy or challenge. There are firmly entrenched beliefs that nothing compares to the quality and benefits of face-to-face learning despite substantial evidence to the contrary.[1,3] For residential universities such as Queen's, there is the conviction that a strong sense of community defines the learning experience which only on-site, traditional programs can deliver. Online programs are contrary to these core and emotive beliefs and consequently may be met with considerable resistance. The reality though is that alternative methods of program delivery must be explored if universities are to be financially viable and grow revenue through increased student enrolment where physical resources (e.g., residences, teaching space, community housing) are limited.

At the graduate level we have found the interest in developing online and blended program delivery quite high, though our experience thus far is limited to professional graduate credentials. The target audience has the relevant background to succeed and typically are users of e-technology in their workplace giving them a familiarity and comfort level with the approach. Another key factor contributing to the acceptance of online delivery includes a robust provincial quality assurance framework that requires clear articulation of learning objectives and indicators of achievement serving to maintain high program standards. Innovative strategies like the incorporation of synchronous encounters into courses and practical exercises serve to foster a rich intellectual environment, idea exchange, and discussion that supplement the more commonplace asynchronous e-learning. This method promotes deeper learning, integration of material and community among learners. The demand for online graduate credentials is high and Queen's must build its resource base and educational support for online and blended program delivery if we are to develop a strong presence in this space. There is tremendous opportunity and because these programs have a large geographical reach they have the added advantage of advancing international reputation and brand recognition.

Flexible and Individual Curricula in Molecular Science

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In this paper I describe the situation of graduate schools in natural science. Most of the graduate schools in science in Germany only accept students with a Master degree in related topics. Therefore the scientific curriculum of the graduate schools does not contain many lectures to be attended, but is more composed of research relevant seminars and scientific talks. This scientific part is supplemented with offers in so-called soft skills courses, which are offered mainly by an umbrella graduate school of the university, supporting the individual graduate schools with respect to special scientific topics.

Introduction

The Freie Universität (FU) Berlin has approximately 35,000 students in bachelor and master courses and offers studies in all fields of Science, Art, Law and Economy. In the last decade it has put its effort in the internationalization, and already at the under-graduated level there are approximately 20% students from abroad. At the PhD level the number of students from abroad is even higher.

Compared to the Anglo-Saxon system, admission to a PhD study in Germany is for the most part only possible with a Master degree. About a decade ago nearly all doctoral candidates did a so-called individual PhD linked strongly to the supervisor and his research field. There was no curriculum offered for these individual doctoral studies and the task of the doctoral candidate was to carry out research and write a thesis. The situation has greatly changed in the last two decades, mainly due to an initiative by the German Science Foundation or other granting agencies, which offered and still offers special grant programs for graduate schools with the focus on the doctoral education of PhD students in a selected research topic.

Dahlem Research School: The situation at the FU Berlin

The Dahlem Research School, which is the umbrella organization for, at the moment, 23 doctoral programs in all fields of Natural Science, Arts, Social Sciences and Economics at the FU Berlin, historically grew out of a graduate school in chemistry established in 2001 and funded during the first five years by the German Academic Exchange Service (DAAD). On the basis of this experience the Dahlem Research School of Molecular Science was founded, at the moment comprising four PhD programs in the field of Molecular Science. The concepts developed there in the last decade have been used to establish a comparable framework for all doctoral programs at the FU Berlin, which are assembled under the roof of the Dahlem Research School. There are three pillars, Humanities, Social Sciences and Area Studies, and Natural and Life Sciences, all containing several individual PhD programs.

Currently more than 900 doctoral candidates are members of the Dahlem Research School,

about one-third of the students coming from abroad. There are still more doctoral candidates at the FU Berlin carrying out an individual PhD, but the number of PhD students within the PhD programs is growing continuously. For example, in 2013, there are 110 PhD students in Molecular Science, a joint PhD program of the faculty of Physics and the faculty of Biology, Chemistry and Pharmacy.

Curriculum Development

According to a report published by the European Physical Society in 2011, more than half of the doctoral candidates aim for a postdoc position in academic research, about one-third plan to go to industry. Almost 40% of the doctoral candidates plan to stay abroad or move abroad after their doctorate. For Chemistry the percentage of doctoral students planning to go to industry will be higher, because of the importance of chemical industry especially in Germany.

Regardless of whether the young scientists stay in academia or work in industry, they will have to do their work in an interdisciplinary environment, in collaboration with other scientists from all over the world. Thus a chemist must be able to speak to a biologist, to a physicist, and at times even to an economist or a lawyer. It is important that the curriculum design for doctoral students takes these new developments into account.

The guiding principle in our curriculum development for the Dahlem Research School Molecular Science was that the contents cannot be the same for everybody in the program. Therefore we designed a kind of enveloping structure by indicating which kinds of courses should be followed, e.g., an interdisciplinary seminar, maybe a course from the master's program, courses on transferable skills, etc. This general scheme will be put in concrete terms on an individual basis via the tuition contract for the PhD student. So in agreement with the PhD student and the supervisors (there are always at least two supervisors in the mentoring agreement between the student and the university) an individual and flexible curriculum is designed. In most of the cases it contains obligatory parts, like the scientific colloquia, seminars and special lectures concerning the scientific topic of the PhD program, which should not exceed half of the curriculum. There is a broad range of elective courses, which can be specialized master courses from different fields, science related courses like scientific publishing or training courses in presentation skills. But there is also the possibility to attend selected language courses, or e.g., in science courses in patent law, depending on the future direction the student is likely to take. General soft skills courses are offered by the Dahlem Research School for all PhD students, the topics comprising research integrity, teaching and higher education, career development both for academia and industry, and special courses for women in science and for international students.

The workload should be relatively low, about five credit points per term, so that students can concentrate on their research work for the PhD thesis, publish results and write the thesis. Because of this flexible and individual character of the curricula of the PhD programs at the FU Berlin, the demand of e-learning is not so high. Up to now no special e-learning tools have been developed for PhD programs. But of course the topic shows up in the courses for teaching and higher education. Especially at the bachelor and master level the FU provides tools to offer or support courses with elements of e-learning.

Summary

As a rule, joining the PhD programs offered by the FU Berlin requires a Master degree. Therefore the curricula of the individual PhD programs are very individual and flexible which only very few obligatory elements. Due to these constraints, there is currently no necessity to develop new tools on the basis of e-learning for the curricula of the PhD programs within the Dahlem Research School.

Comments on Technology-Based Curricular Innovations at Purdue University

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Student success is a top priority for virtually all graduate schools, particularly in the rapidly changing engineering and science fields. With the explosion of new knowledge, university (and society) pressures to reduce attrition and time-to-degree, budgetary challenges that can include reductions and rescissions, and student interest in online learning options, providing high quality graduate education at an affordable price can be challenging. We believe technology will continue to play an ever increasing and important role in enhancing the quality of graduate education as part of integrated curricula spanning on-campus and online modalities.

This paper provides an overview of some of the technology-based innovations being explored at Purdue University that show promise in assisting graduate students. These innovations fall into three broad categories: simulations, analytics, and professional skills technologies.

Simulations or, more precisely, modeling and simulation environments, have been created to provide experiential learning and accommodate the integration of research into program curricula. Simulation environments, in general, provide an opportunity to engage students in experiential learning with flexibility not practicable in conventional laboratories. Often criticized in the past as an unrealistic substitute for hands-on experience, many simulations being considered now are overcoming the commonly cited shortcomings. Distinguishing aspects in favor of simulations include safety, low cost, convenience, and the ability to perform many experiments in a short period of time. If done well, working in a simulation environment can be fun for users and, in some cases, the preferred choice of students.

A number of instructional simulation tools have been developed and are being used at Purdue, such as a virtual dissection tool developed for students in veterinary medicine. Another example is the use of client communication simulations, to help veterinary students improve their interactions with clients who have sick animals. But, arguably, the best example of an innovative modeling and simulation environment employed at Purdue is the nanoHUB. Operated by the Network for Computational Nanotechnology (NCN), the nanoHUB provides a platform for running modeling and simulation tools that support research and education in nanotechnology areas that include bioengineering, electronics, materials, mechanics and photonics. The nanoHUB is open to scholars from all over the world. The NCN actively encourages scholars to contribute presentation materials, lectures, animations, and analysis tools to the HUB. Tools in the nanoHUB can be hosted as executables or released as open source code at the authors' discretion.

Widespread dissemination is a strength of the HUB, which attracts a large audience of users who can use the tools. Authors of nanoHUB materials and tools are cited in top-tier publications by users throughout the world. Hence, both the HUB contributors and nanoHUB

users receive recognition. The nanoHUB has had a very positive impact on graduate students engaged in PhD research, in the sense that research products published on the nanoHUB can be accessed and used immediately and cited by the international community. This kind of recognition through the nanoHUB can put students in a much stronger position at the time of graduation when seeking employment in academia or industry.

In terms of instruction, the nanoHUB allows instructors to incorporate simulation-based learning in the classroom as well as share lecture materials, which can be found on the website under "Available Teaching Resources." The impact of the HUB has been tremendous. With over 3,900 resources hosted on the HUB by over 1,000 contributors, the HUB serves more than 255,000 users on an annual basis.

The second broad category of innovation highlighted in this paper is the application of academic data analysis, a.k.a. analytics. The use of data analysis in business to improve performance has been underway for decades, but is far less developed in academic circles. Many universities, Purdue included, are developing and deploying analysis tools to help improve time-to-degree and reduce student attrition. A noteworthy example at Purdue is the Signals system, which was developed to provide early warning to students about their risk of falling behind in class. The feedback provided by Signals to the students via the web includes detailed steps they can take to improve their performance. At this point, more than 50 instructors at Purdue have used the Signals system in one or more of their classes, impacting more than 11,000 students. While usage on the Purdue campus has primarily been at the undergraduate level, the principles and technology translate well to graduate education.

The third and last broad category of innovation mentioned in this paper is the class of professional skills technologies. These are technologies to assist students with professional skills that are important for career success. These skills may vary by discipline but often include effective communication, grant writing, networking, interviewing, and more. While in many institutions, professional skills are not considered a formal part of the graduate curriculum, they are recognized as a valuable part of graduate education. At Purdue University, we are employing plagiarism detection software to help thesis advisors help students understand how to properly reference the work of others and to avoid plagiarism in writing. We are also developing gaming software to help students improve their communication skills. Our current project is a driving game that attempts to improve grammar. We have observed that many of our international graduate students along with a number of our domestic students routinely make grammatical errors when presenting (and speaking in general). In the game, the player is driving a vehicle while listening to the radio. When the player hears a sentence that is grammatically incorrect, he or she will have to make a driving decision—take a left turn if the sentence is correct or a right turn if the sentence is incorrect. All incorrect sentences and phrases are repeated with the correct grammar emphasized. The idea is simply to create an educational activity that is fun and that will be used by students often as recreation.

Space constraints do not allow for a comprehensive overview of technology-enhanced education at Purdue. The examples mentioned above are but a few highlights from among the numerous technology-based education tools and applications being used on the Purdue campus. It is clear we are seeing a rapid increase in the rate at which educational technology is being adopted by faculty, both in the context of in-class and online education.

Curriculum Design in the Humanities and Social Sciences

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Background

Macquarie University is a comprehensive university of about 40,000 students in the inner north-western suburbs of Sydney. Macquarie has about 2,000 Higher Degree Research (HDR) students, 97% of whom are doing the PhD. Traditionally, in Australia, the PhD is by thesis alone, without coursework, or if there is coursework, it's a short non-graded course on research methods. The pathway to HDR at Macquarie as at all other Australian institutions has been by way of the one-year add-on Honours program, a fourth undergraduate year for elite students.

There are problems with the add-on Honours year. It is declining in appeal to completing Undergraduate students; it is not internationally portable, and it does not provide adequate research training or disciplinary content for students progressing to HDR. Many Australian universities are considering moving away from the Honours pathway to a more internationally standard master's program as the core preparation for HDR study. In 2013, Macquarie started teaching its two-year Master of Research as the standard pathway to PhD admission. This degree comprises one year of advanced coursework with a one-year structured individual research project. Key aims of the program are:

- To develop an internationally recognised and transferable HDR pathway program;
- To provide students with a deeper advanced knowledge of the discipline in which they intend to become researchers;
- To provide students with a structured introduction to research methodology, project management and research planning strategies;
- To establish a clear supportive cohort of students as they progress from undergraduate into HDR.

Online teaching

Departments developing their programs for the Master of Research were given the option to run their units online. The uptake for this option was greatest in the primarily text-based programs in the Humanities and Social Sciences. These have a strong tradition of online offerings at the undergraduate and postgraduate coursework level. Uptake has not been significant in the Sciences. Online teaching is especially attractive for some of our social science disciplines, because they have traditionally taught a large number of PhD candidates living overseas, some of whom never set foot on campus.

However, the decision was made not to offer the master's program wholly online at this stage. This was for a number of management reasons and also because it was considered impractical

to offer the compulsory and centrally-taught Research Communications unit online, because this unit required face-to-face engagement.
As the academic responsible for implementing this program, I also have a number of other issues/problems with full online delivery that I would like to raise and receive feedback and advice about:

1. **Development of a cohort:** One of the key aims of the master's program was to develop a strong sense of a cohort for students. This has traditionally been a problem for Australian HDR programs. Honours classes are small, and with no coursework program in the PhD, students do not develop a strong sense of belonging to a group. Australia is a country of a small number of large cities where the bulk of the universities are situated. Sydney and Melbourne each have a population of about five million in a national population of 22 million. Students commonly grow up, receive their education and work in the same city. They do not travel to be educated and do not live on campus. In short, there is a lot militating against the development of strong campus life, and a strong HDR cohort.

   Issue 1: Is it possible to develop a real sense of a student cohort with online teaching?

2. **Pastoral care:** One of my responsibilities as Dean of HDR is the pastoral care of HDR students and supporting/negotiating the relationship between supervisors and candidates, when they run into difficulties. In my experience, it is easy for the relationship between supervisory panels and distance research students to enter into difficulties and miscommunication, even though we require the appointment of a local adjunct supervisor. Not only is it easy for relationships to become tricky at a distance, it is also very difficult to mend them. Often, it takes a long time for problems to be recognised and also it is very difficult to negotiate at a distance. This problem could be magnified in coursework programs that are striving to introduce students to research, because students have not developed resources of self-reliance and do not have well developed research strategies.

   Issue 2: How do you develop proper systems of pastoral care for distance research coursework students?

5: Risks and Benefits of Online Learning and MOOCs

Assessment and Credentialization in Online Education

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Online Learning in Graduate Education in Malaysia

The use of online learning in graduate education has emerged tremendously. Implementation of online learning in graduate education does not only cover the use of online mediums in delivering lectures but it has been implemented beyond that, with some universities offering online degree programmes through the medium. However, in Malaysia, there are no graduate programmes being offered entirely online yet. In Malaysia, the use of online medium in graduate education programmes is focused more on assisting teaching and learning outside class.

All of the graduate programmes in Malaysia are accredited by the Malaysian Qualification Agency (MQA). MQA has released two categories of standard, which are General Standard; Master's and Doctoral Degree by Coursework and Mixed Mode (Coursework and Research) and Master's & Doctoral Degree By Research and Programme Standard according to field of studies. Based on the standards, at this moment, MQA does not accredit any postgraduate programmes in universities that deliver instructions through entirely online learning mediums. Face-to-face sessions between students and lecturers remain a must in graduate education programmes in Malaysia. However, MQA encourages universities to integrate the use of online learning in teaching and learning of postgraduate courses. Hence in Malaysia, online degree postgraduate programmes are a rare discussion. Nevertheless, things should be changing in the future since online learning underscores not only education but many sectors. In various situations, communication is difficult to sustain throughface-to-face and online communication mediums are the alternative. With the competition in the education business being heating up today, Asian countries compete to be on the top rank as global higher education hubs. Consequently, the Malaysian government has to transform the belief and has to start kicking on the availability and validity of delivering graduate programmes entirely online.

Having ventured into internationalizing our education sector over a decade ago, Malaysia is at an advantage in this race and Universiti Teknologi Malaysia (UTM) plays an important role in the Malaysia Higher Education sector. In UTM, we have set up our own e-learning system for graduate education courses. Along with the e-learning system, we also join the Open Courseware (OCW) consortium under Massachusetts Institute of Technology (MIT) to share part of our established graduate education courses with other universities. We believe having only excellent online facilities is not the only key point to transform our institution to be a global competitor. We need more than that including a proper blueprint and a proper planning on transformation. Therefore, besides the medium itself, our new concept and perspectives of Academia has also played an important role to transform UTM to be a competitive institution. Based on the concept of the New Academia, UTM is set to become an Entrepreneurial

Research University characterised by quality education rooted in deep knowledge culture, high impact contribution and value-driven initiatives. Through the concept, instructional materials do not solely come from books and journals but experiences, case studies, Internet-based resources, field work, and tacit knowledge of an individual. Within the listed materials, the assessment process is indirectly changing, where assessment through online mediums is made possible and opens up enormous potentials.

Issues Need to be Resolved

The medium itself; online system etc, is competent for implementation of online learning. However, the remaining issues are how well our professors put their trust in online learning and their commitment to use online learning in their courses. Their beliefs on online learning are closely related to their awareness of the validity and the capability of online education. Other than believing and being committed, our professors require skills in conducting online learning courses. Online learning skills do not only cover the system-based skills, they also cover e-pedagogy and as well as social communication skills where without these skills, the online learning process might not execute effectively. Another issue that needs consideration is the verification of students' participation, credentialization and assessment of students' learning. As we are aware, an online learning system will only recognize students' records based on username and password. Whether the real student is the one who logs in into the system or not, such cases can't be detected by the system automatically. This is a difficult issue to be resolved and at this moment, the least that the higher education providers can do is to have a clear policy, rules and regulations of online learning where ethics is the main factor that needs to be enforced. Besides that, triangulation from other sources of assessment mechanisms needs to be conducted such as interviews, paper-based test, etc.

Challenges in assessment of student learning through online systems also arise due to the physical distance between educators and students. Besides that, the way educators assess learning occurring through online mediums is a totally different way from face-to-face instructions. In face-to-face instructions, the learning process can also be identified from facial expressions, body language, where these behaviours can easily be observed by the educators with naked eyes. Such observation is impossible through online learning where the learning process only can be represented by student's log data, online discussion transcripts, and online tests or quizzes. With a new perspective on how learning takes place in online mediums, it creates challenges in terms of knowledge on how to analyze students' online learning process. Few research studies carried out by technologists and instructional designers have come up with methods to understand how students learn through online mediums. One of the popular research areas is exploring the online interaction between students and students, between students and lecturers, and between students and learning materials. Social interaction during online class work is used to determine the quality of computer-mediated educational programmes. Administration of content analysis on the textual materials being produced during online discussion to investigate aspects such as critical thinking and creativity for the purpose of assessment is greatly encouraged nowadays. These concerns are raised due to the lacking of online learning in several features compared to face-to-face learning. The fact that most communication is replaced by text means features such as gestures, absence in appearance and verbal cues have limited online learning. Although most research states that students describe positive experiences with online learning, there were still some students who perceived online learning as being more challenging than face-to-face courses due to difficulty in communicating with peers, as there is absence of emotional connection.

With respect to these issues, numerous studies are conducted to understand students' engagement in order to verify the quality of learning. They investigated the extent of the association between students' engagement and academic performances. Several findings, such as there is a positive but weak relationship between students' engagement and scores of tests and also students' engagement is positively correlated to students' GPA, have open spaces for us as academicians and researchers to explore more.

The Role of Traditional Universities in Online Education

Traditional universities must have a policy for online education in postgraduate programs. Besides a policy, a specific platform and system must be set up by the universities to kick off the implementation of online education. Aligned with system set up, training for the academicians and students must be carried out to have them ready for the new platform of teaching and learning at the postgraduate level. Another important aspect of the implementation of online education is the ICT infrastructure in universities. The Internet bandwidth must be wide enough to support the high traffic access from students. Besides that, the system itself must be reliable, valid and able to support system access. In UTM, we have an e-learning policy in general. In the policy, our university mentions the owner of the teaching and learning materials, roles of lecturers, students, ICT office, Centre for Teaching and Learning, Faculties, Universities etc. Besides policy, enforcement on New Academia in UTM also has opened up more spaces for the implementation of online education in Graduate Education programmes. With a complete and proper planning on the use of online education at the graduate level, assessment and credentialization in online education can improve not only at the implementation level but also on the level of awareness and usage among professors at universities.

The MOOC Model and Graduate Education: Will it Work?

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The *New York Times* has declared 2012 the year of the MOOCs (Massive Open Online Courses) and the phenomenon seems to be keeping its extraordinary expansion in 2013. Whereas MOOCs have mostly been associated with undergraduate education, there is evidence that graduate education, lifelong learning, professional development and transferable skills development are taking a growing place in this ecological niche.

A MOOC Master's Degree

Udacity, a Silicon Valley based MOOC provider, the Georgia Institute of Technology (Georgia Tech) and AT&T announced last May a partnership to offer in 2014 an online Master's degree in Computer Science through MOOCs.[1] Access to courses included in the program will be free through Udacity, but students who wish to obtain a degree will have to apply for admission and pay modest tuition fees of less than $7,000, as compared with the $45,000 on-campus fees. AT&T will provide a $2M jump start for the program, providing technology access, connectivity and products at inception, as well as evolving service and platform support. Concerns have been raised, namely by Russell Poulin from WICHE Cooperative for Educational Technologies to Jeffrey R. Young for The Chronicle, as whether this will be a training program for AT&T and how much influence AT&T will have on the curriculum.[2] Rafael L. Bras, the university provost assured that the program will use the university's curriculum, approved at every level of the University System of Georgia, including the Board of Regents, and that AT&T employees will get no special consideration through the admission process. However, according to the program FAQ section, AT&T will have access into the program to train its own employees and will recruit graduates.[3]

According to Sebastian Thrun, Udacity CEO, interviewed by David F. Carr for InformationWeek, what Udacity is creating is an

> online version of education that really works, that has a great retention, great outcomes of education and really reaches people, not just the world's most motivated 1%, but can be made to work for many more people […] I think we've found the magic formula.[4]

The "magic formula" integrates, for those admitted in the program to obtain the master's degree, proctored exams and learner support through tutoring, online office hours and other type of support services, in addition to the online class comprising videos and Web-based

1 https://www.udacity.com/georgiatech
2 http://chronicle.com/article/Ga-Tech-to-Offer-a-MOOC-like/139245/
3 http://www.omscs.gatech.edu/faq/
4 http://www.informationweek.com/education/onlin-learning/udacity-ceo-%20says-%20mooc-%20magic-formula-emer/240160169

assessment. It remains to be seen whether students following the program for free through Udacity will display higher rates of completion and success rates as compared to other MOOCs where massive non-completion rates are observed. According to Dr. S. James Gates Jr., interviewed by Tamar Lewin for the New York Times, "this is the first deliberate and thoughtful attempt to apply education technology to bringing instruction to scale. If it really works, it could begin the process of lowering the cost of education, and lowering the barrier for millions of Americans."[5] Russell Poulin agrees in *The Chronicle* that the program at Georgia Tech "is unique in that it is trying to reduce costs by adapting teaching for an online setting rather than simply transferring traditional methods online."[6] This will be an interesting story to follow. The future will also tell whether the model is suitable for disciplines outside STEM.

MOOCs for Life Long Learning, Professional Development and Transferable Skills Development

Phil Hill, in a comment posted in June 2013 on e-Literate, reports data obtained by universities offering MOOCs through Coursera or by edX, two major US MOOCs providers, show that approximately 70% of the students registered in a MOOC and answering the survey had at least a bachelor degree.[7] Belanger and Thornton realized that a survey for Duke University in February showed that student motivations for enrolling into a MOOC on Bioelectricity were (1) for the general interest in the topic (87%), (2) to extend current knowledge of the topic (53%) and (3) for professional development (44%).[8] Similar observations were made by University of Edinburgh on six different courses offered through Coursera.[9] The MOOC learner aspirations were (1) to learn more about the subject area (96%), (2) to try online education (78%), (3) to get a certificate (62%) and (4) to improve career prospects (49%). These data strongly suggest that professional development is an important motivation to enrol into MOOCs. This phenomenon is further evidenced by the fact that several MOOCs to be offered by August 2013 and aggregated by Class Central are indeed designed for professional development.[10]

In a graduate education perspective, development of transferable skills is now considered essential for our graduates to enter into the workforce. Vitae, a group from UK supporting professional and career development of postgraduate researchers has proposed, in consultation with academic and non-academic employers, a thorough list of skills to develop in order to enhance a career as a researcher.[11] Whereas several skills are developed during research training and through graduate program curriculum—such as research methods, information seeking or subject knowledge—others are normally not covered by graduate program curricula, such as skills in project planning and delivery, financial management, or people management. MOOCs might thus help to complement program curricula. MOOCs starting in September 2013, in Creativity, Innovation, and Change,[12] offered through Coursera or Principles of Project Management,[13] offered though Open2study, an Australian MOOC provider, are good examples of such courses.

5 http://www.nytimes.com/2013/08/18/education/masters-degree-is-new-frontier-of-study-online.html?_r=2&
6 http://chronicle.com/article/Ga-Tech-to-Offer-a-MOOC-like/139245/
7 http://mfeldstein.com/moocs-beyond-professional-development-courseras-big-announcement-in-context/
8 http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/6216/Duke_Bioelectricity_MOOC_Fall2012.pdf?sequence=1
9 https://www.era.lib.ed.ac.uk/handle/1842/6683
10 http://www.class-central.com/
11 http://www.vitae.ac.uk/
12 https://www.coursera.org/course/cic
13 https://www.open2study.com/subjects/principles-of-project-management

While interviewing colleagues from Laval University last fall, in order to know their need to better prepare students for employment or to succeed in their graduate studies, we heard, among other things, concerns about the need to improve their written and oral communication skills. In a comment posted on MOOC News and Reviews,[14] Robert Connolly, the director of the C.H. Nash Museum at Chucalissa and Associate Professor at the Department of Anthropology at the University of Memphis, shares the rewarding experience of graduate students with shortcomings in written skills who enrolled in a MOOC on "Writing in the Sciences"[15] through Coursera. Graduate committees overseeing students' progression often find shortcomings in argument construction, a skill to be developed earlier during their formation. To this, Connolly answers: "there is a MOOC for that,"paraphrasing "there is an app for that." And indeed, a MOOC entitled "Think Again: How to Reason and Argue" may meet the need.[16] There are several other examples of MOOCs that my increase graduate students' learning experience.

How to Adjust MOOC Model to Better Advance the Distinctive Features of Graduate Education

Dr. Tony Bates, a specialist of e-learning and distance education from Vancouver, Canada, proposed during the 2013 LINC meeting held at MIT some avenues to improve MOOCs, and among them, the importance of using more constructivist approaches.[17] Indeed, Bates and other specialists in higher education agree on the importance of knowledge construction as opposed to knowledge transmission, and MOOCs have been criticised for largely being vehicles of knowledge transmission. However, a MOOC typology has set in, proposed by Stephen Downes and George Siemens, making a distinction between xMOOCs characterized by knowledge transmission through videos and quiz, and cMOOCs or connectivist MOOCs that rely on knowledge construction by the learners.[18] cMOOCs provide opportunities to use new teaching approaches where students learn from each other and construct their knowledge.

Graduate training might improve through the use of cMOOCs, or xMOOCs integrating cMOOC features such as social networking of learners and experiential learning, or even through in-class activities. For instance, Mohamed Noor, a biology professor from Duke University, who taught his Genetics and Evolution class in the MOOC form, used it with a new flipped classroom version for on-campus students. His experience is discussed in an interviewed posted by Robert McGuire.[19] This flipped classroom approach, where undergraduate students first learn new contents online through a MOOC, and then, come back to work and discuss in class to deepen their understanding and discuss problem solving may very well be transposed at the graduate level.

Conclusion

The MOOC phenomenon is viewed as a disruptive innovation in higher education. It brings a different perspective to knowledge dissemination as it has been traditionally conceived in university contexts. MOOC is about knowledge sharing through free or low cost (for

14 http://moocnewsandreviews.com/theres-a-mooc-for-that-how-my-grad-students-use-moocs-to-complement-our-curriculum/
15 https://www.coursera.org/course/sciwrite
16 https://www.coursera.org/course/thinkagain
17 http://linc.mit.edu/linc2013/presentations/LINC2013Bates.pdf
18 http://www.elearnspace.org/blog/2012/07/25/moocs-are-really-a-platform/
19 http://moocnewsandreviews.com/inside-duke-professors-flipped-classroom-mooc-qa-with-mohamed-noor/

now) courses offered by prestigious universities. The model will evolve as well as modes of delivery, but knowledge sharing will always be the cornerstone of the phenomenon.

MOOCs as Auxiliary Material for Classical Lectures and Seminars

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The physicist and professor Loránd Eötvös, after whom my university is named since 1950, said that the quality of a university depends on the quality of its professors. To challenge this claim, let us first have a historical overview of different epochs of university education and the teaching technology used.

In the middle ages, there was a very limited number of books available, and mainly for professors only. Thus, the method of education was predominantly oral lecturing and taking notes by the students attending the lectures. With the wider availability of printed books, students could even buy them and—in principle—learn without attending lectures or seminars, but this did not take place; professors were still needed to explain book content to individual students. At many universities, students also played an important role in choosing the professors to be invited to the institution.

With the advent of new media, "radio university," and later "TV university" was created and courses delivered using the broadcasting possibility that has reached virtually anyone interested. However popular, they did not get involved in the teaching procedure at universities, they only served as materials equivalent to popular textbooks, and personal exchange with instructors remained a determining element of the learning procedure.

The wide availability of personal computers was followed by a development of "multimedia" teaching materials. These materials also turned out to be used the same way as their predecessors; as a kind of more elaborated and user friendly "textbook." The next step was the formation of social networks based on the use of PCs and equivalent mobile devices, and a combined way of using multimedia and community portals led to what has been called e-learning. However, the role of instructors was still important within this context; in a typical e-learning environment, it is the instructor who creates the basic materials available for students, along with the "reference manual" of their use. Though it is possible for students to interact or "discuss" the material with each other, especially within the framework of so-called e-learning 2.0, typical discussions are scattered, often irrelevant, not really allowing students to concentrate on the structure and purpose of the course. Therefore, the really efficient use of e-learning is a combination with the traditional virtual and face-to-face learning, with the professor in the leading role.

E-learning is mostly used within a higher education institution, as kind of an internal network for teaching and learning purposes. The possibility to open up this platform to a larger audience led to the attendance of real-time courses online, or watching them offline, for a large number of people being connected to the teaching staff and to each other by the IT network. This large-scale distribution of the multimedia courses, called MOOCs, is still in development, and experiences concerning their use date back only for a couple of years.

We can also raise the question whether they will replace traditional (face-to-face) university courses, or if they will contribute in a determining way to those courses, or would at least contribute to the credits needed for a higher education degree.

At the undergraduate level—where most of the MOOCs are used—they have initiated a really large participation which could lead to a convenient solution for the problem known as "mass education." However, there is an enormous dropout rate; typically only a small fraction of the subscribed attendants participate in the prescribed activities, and only a few percent actually try to take the examination. Another problem is the assessment. Though up-to-date technologies enable personal identification using highly developed IT methods, a really individual activity without involvement of another person in solving the problems of the examination is not satisfactorily guaranteed while being assessed unattended.

The special feature of undergraduate education—except for a few general "transferable skills" trainings—is the "socialisation" of the student in a given discipline. To get acquainted with the specific objects of a scientific discipline, to understand its specific aspects and ways of thinking, the student needs to acquire a well-developed structure of knowledge, along with a precise understanding of concepts, methods and technical terms. At the scale of the number of attendants of MOOCs—which is at the order of thousands of people—there is necessarily a large variety of previous knowledge that should be considered as the basis for the understanding of the course material. Thus, there is no single way to explain the concepts, the meaning of terms and the essentials of methods to different students. To cope with this challenge, a large variety of unforeseen scenarios would need to be taken into consideration and made available for the student in case s/he needed them to successfully follow the course and not to lose track. Of course, there are situations when fellow students can readily help each other, but it depends on many factors whether it really works. Questions should be worded in a clear way by the student, and it should be understood the right way by the peer student. There must be at least one student participating in the virtual consultation who understands the question and is also able to properly answer it. Experience does not support that this always happens. Thus, there is a great need for a careful intervention on the instructor's part to make sure that no student would be left behind in the course, not being able to get successfully "socialized" in the given discipline. Again, the need for a face-to-face contact between student and instructor is a necessary part of education, and MOOCs can only be considered as auxiliary material to the classical form of education.

Graduate education is different from the above explained. Students at this level have already been "socialised"—hopefully with satisfying result—in a discipline, thus they need to enlarge the horizon of their knowledge, and mostly learn special topics within a field, more or less related to the discipline of their undergraduate studies. Considering this, students should be more uniform concerning their previous knowledge on which actual course material can be based. However, in reality, this might not be the case. Modern higher education includes an increasing number of interdisciplinary programmes, which results in a student audience having largely different previous formation, in different disciplines. A MOOC designed to suit students having a formation in one discipline, might not be useful at all for students trained in another discipline. A suitable example is biophysics; a background in biology gives a firm knowledge concerning species, living organisms and physiology, without much information concerning mathematical and physical basic principles, and vice versa. Thus, there should at least be two (but possibly more, taking into account previous formation in chemistry, informatics, earth sciences, or even mathematics) alternative MOOCs designed for the purpose of teaching the same material.

There is also another major problem with graduate courses, especially at the level of doctoral studies. The student might need special material to be able to successfully conduct research necessary to complete advanced studies, which might be the result of scientific activities dating back only for a few years. Thus, the frequent change in material, concepts, objects that are included in an advanced MOOC results in its becoming obsolete soon.

To sum up; at the advanced level, there is a great need for a personal, face-to-face guidance by experienced instructors who can explain concepts to students with very different background knowledge, and are aware of most recent developments in the given discipline. MOOCs can be very useful teaching aids at the graduate level, but the quality of education and training is critically dependent on the quality of the professors involved.

MOOCs and Graduate Education: Uneven Benefits?

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Massively Open Online Courses, or MOOCs, have primarily served as a model for delivering undergraduate coursework, yet their potential impacts on graduate education have captured the attention of many graduate institutions. One of the first forums to explore the MOOC model in the context of graduate education was a session at the 2012 Annual Meeting of the Council of Graduate Schools, "Online Learning in a Global Context and the Role of MOOCs." Among the session participants was Anant Agrawal, President of edX, a MOOC provider co-founded by Harvard and MIT. Dr. Agrawal's stated aspirations for edX courses are common among MOOC providers: to provide free, high-quality courses to students around the world. Broadening access to higher education is also the mission of Coursera, another highly successful MOOC provider based at Stanford University. Coursera's vision is clearly articulated on its website: "We envision a future where everyone has access to a world-class education that has so far been available to a select few. We aim to empower people with education that will improve their lives, the lives of their families, and the communities they live in" (Coursera, n.d.).

Despite the democratic language used to support the MOOC model, the trend has raised questions about the nature and the distribution of its benefits. Many in the CGS community have noted that students are not necessarily the winners when serious questions remain about the quality of student experiences in these courses, and the adaptability of the MOOC model, which has been used in large part for introductory courses, to graduate education.

The CGS graduate community voiced a number of other reservations about MOOCs at a 2013 CGS Summer Workshop in a session titled "The Role of MOOCs in Graduate Education." Some concerns not already mentioned above included: the challenges of verifying student identity if MOOCs are credit-bearing; pressure on institutions from state legislatures who might see MOOCs as a more efficient and less expensive delivery model for graduate education, but which might overlook critical issues related to quality; new challenges for assessment of courses and student learning; policies for accepting transfer credit from students who have participated in MOOCs; and investments in the training of faculty to deliver high-quality courses in a MOOC platform. A question repeatedly raised in this forum was whether graduate schools could better achieve their educational missions with traditional online courses that are not "massive" and "open."

Uneven Benefits for Institutions and International Students?

In the two CGS meeting sessions held on the topic of MOOCs, many members of the CGS community observed that the MOOC model has the potential to impact institutions in unequal ways. The fact that MOOCs were initially an experiment by a select number of elite institutions has led many to wonder whether smaller or less highly-resourced institutions

could survive in a world where prestigious universities are offering coursework for free or at minimal cost. This worry goes beyond concerns about graduate education business models. As one dean expressed it at the 2013 CGS summer workshop, MOOCs may introduce the "danger of elitism" if the proliferation of course credits at high-ranking universities were to devalue credits earned in face-to-face courses at less prestigious ones. The dean added that students who begin their education in MOOCs could require additional mentoring and counseling as they adjust to other forms of coursework.

Experts in international education have also pointed to the potentially uneven impacts of MOOCs on students and institutions in different countries and regions. A recent article in Inside Higher Ed, "The world is not flat," explored three issues that may limit the portability of Western MOOCs to other countries and cultures: language barriers; varying cultural expectations about pedagogies and learning environments; and limited access to the internet (Rivard, 2013). To be fair, some MOOC providers have already begun to address these concerns. Both Coursera and edX have added international institutions to their network of MOOC providers, a move that may possibly diversify the content and pedagogical styles offered in their course lists. Coursera has also launched a "Global Translation Partners Program" that has leveraged a network of alliances to translate courses into Arabic, Chinese, Japanese, Kazakh, Portuguese, Russian, Turkish, and Ukrainian, with additional languages to be added in the future.

Of course, one of the difficulties of assessing the impacts of MOOCs is that they are so quickly evolving and adapting as new institutions join the large provider networks and student demand increases.

Looking to the Future

CGS will continue to organize discussions of the MOOCs given our membership's strong interest in understanding and responding to this delivery model for undergraduate education, and—looking ahead—to graduate education. According to a 2013 survey of CGS member institutions, MOOCs were the 6th most frequently cited issue of concern to graduate deans.

Yet CGS member views of graduate-level MOOCs are not wholly skeptical. One idea that generated excitement at the CGS Summer Workshop session was the possibility of creating MOOCs for the delivery of broad professional development courses focused on transferable skills for graduate students. Would MOOCs of this kind address the growing demand for centralized training that graduate-level faculty often don't have the time, or the training, to provide? Future CGS discussions of online education and MOOCs will assess these and other ideas as MOOC platforms continue to evolve. The next occasion for discussion will be a plenary presentation at the 2013 Annual Meeting (December 4-7) featuring Daphne Koller, co-founder of Coursera.

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6: Engagement with External Organizations

Impacts of University Rankings in Korea

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In our daily life the tendency toward 'comparison' is one of our essential attributes and ordinary people naturally show interest in ranking things, individuals or groups of people in various aspects. Popular items of comparison in Korea are university rankings. High school students and their parents consider university rankings as one important factor in deciding where to submit application forms for entrance. These days government, funding agencies, media and universities pay attention to annual announcements of university rankings from various organizations. Their interest in international university rankings have been increasing in the last ten years due to the fact that the role of universities is getting more important in the knowledge economy and the quality and impact of education and research in universities is considered as a basis for national competitiveness in a global context.

National rankings of universities in Korea are generated by some major newspapers, such as Joong Ang Ilbo, Chosun Ilbo. Some of the indicators in rankings are the faculty/student ratio, the number of (SCI) papers per faculty member, research funding per faculty member, scholarships per student, the employment rate of graduates, the retention rate, etc. International rankings with a powerful influence in Korea are the World University Rankings by Times Higher Education (THE), the QS World University Rankings and Chosun Ilbo-QS Asian University Rankings published by Quacquarelli Symonds (QS). Indicators in these rankings are, according to QS's Wikipedia page, academic peer review (40%), the faculty/student ratio (20%), citations per faculty member (20%), recruiter reviews (10%), and international orientation (10%).

The university ranking 'business' has been growing rapidly in the last ten years, thanks to the development of new technology which enables us to track and collect various information. The Joong Ang Ilbo use the data from the Ministry of Education and the National Research Foundation. THE draws its ranking data from Thomson Reuters, and the QS World University Rankings uses data from Scopus, part of Elsevier. As the Wikipedia page on the QS World Rankings states, "The information used to compile the World University Rankings comes partly from the online surveys carried out by QS, partly from Scopus, and partly from an annual information-gathering exercise carried out by QS itself. QS collects data from universities directly, from their web sites and publications, and from national bodies."

However there have been strong criticisms of the influence of university rankings and their methodologies. For example, according to Nature, "many universities see wild swings in their rankings from year to year, which cannot reflect real changes in quality. They focus excessively on research output, neglecting the many other crucial roles that universities have." The indicator 'faculty student ratio,' the only one factor related to education, cannot reflect the quality of education. The outputs from scientific research are many and varied. Nature also notes that disciplines have different citation rates, and that league tables lump

universities with different objectives. In addition to that, most rankings use reputational surveys. One argument is that these assessments often use relatively too few reviewers, who may not be well informed about all the universities they are being asked to judge, and that in world rankings there may be a bias towards English-speaking countries.

A good sign is that the ranking agencies are now trying to improve their operating system by promising to rank universities according to additional criteria and to compare institutions with similar missions.

In Korea, the university rankings have played a strong role in stimulating innovation in the university environment, encouraging faculty to speed up in producing their research outputs as measured by the number of SCI papers, impact factors and citation indexes. Annual reports on university rankings have been influencing policy-makers to increase their investments in higher education. As a result, the ranks of Korean universities have been increasing rapidly. For example, in QS World University Rankings, Seoul National University: 93(‘05) → 35(’13), KAIST: 198(‘06) → 60(’13), POSTEC: 233(‘07) → 107(’13), Yonsei University: 236(‘07) → 114(’13). We note that the QS Asian University Rankings of the above 4 universities in 2013 are 4, 6, 7, 16, respectively.

The problem is that government, funding agencies and university administrators have been driving the academic community to consider the university ranks as a kind of prime goal of university life. As a result, until recently, most professors gave their energy mainly to publishing papers in quantitative terms, more or less neglecting their role in a classroom and the value and impact of scientific outputs. Fortunately, the academic environment in Korea is changing now to pursue its effort in qualitative terms.

In view of the arguments above, it seems that it is about time for the global academic community to review all international rankings and to declare new directions and principles for fulfillment of fundamental roles of higher education, like ‘the San Francisco Declaration on Research Assessment’ announced on May 20, 2013. For the improvement of assessment of higher education, we should check both positive and negative impacts of university rankings on education and research with the question. “Is the world university rank of a university really a meaningful gauge of the global standing of the university?”

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Technology and University Rankings: A New Tool for Indiana University-Bloomington

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The U.S. News and World Report Rankings, the Princeton Review, Kiplinger ratings, all of these ranking organizations have their own metrics, polling techniques, and areas of focus. For many years as a professor I did not pay attention to these rankings. It was obvious to many people in academia, both administrators and faculty, that these rankings were often fickle and at times arbitrary; they were based on unscientific methods that left more questions than they tended to answer. However, in more recent years it has become increasingly apparent that we must pay attention to these rankings. We must pay them mind not because they are accurate, or because each different rank presents a clearly defined difference, but because others pay attention to these rankings. Rankings are vital in understanding the higher education landscape not because of the validity or scientific rigor but because they are important tools for recruitment, institutional stability and the career outlook of our students.

When I would speak to alumni, faculty, and other stakeholders as chair of the MBA program at Indiana University's Kelley School of Business, I became gradually more aware of how important rankings are for a program and a university. Even though these rankings are often capricious and practically impossible to predict from year-to-year, many stakeholders found them invaluable tools in assessing the performance of Indiana University. Alumni would contact me and my colleagues asking why the MBA program's rankings had changed. We would be contacted by donors concerned about how our rankings compared to other universities' rankings. These rankings are not important because they show concrete data about schools but because they carry with them, however unwarranted, an amount of prestige that no other metric carries.

Both prospective students and teachers pay attention to rankings as important aspects in the recruitment process. Prospective students will seek out schools that are high in the rankings and tend to avoid and ignore schools of lower rankings. Thus, it is of utmost importance to pay attention to these rankings not because they show real and tangible differences between schools but because they are important factors in recruitment of students.

Not only are they important recruitment tools, but they also can affect institutions financially. Some—but not all—companies choose what schools to donate to based on the school's ranking. Additionally, many companies will only recruit graduates from top ranked schools.

Not because a graduate from a school ranked twenty is significantly more prepared for work in their field than a graduate from a school ranked twenty-one, but simply because the rankings are a facile demarcation that can easily be used to differentiate between one graduate and another.

Furthermore, the number of organizations and media who conduct rankings seem to have increased quickly over the years. In fact, one might say that rankings have become their own industry. These different ranking companies all have different methodologies and metrics; return-on-investment, value added, reputation among peers, and productivity of faculty.

These rankings have become so vital to the identity of some schools that some universities and colleges actively court these ranking organizations. Large amounts of money are spent in order to present schools in the right light, so that ranking companies will rate these schools well. Regardless of the direct utility of this practice it must be acknowledged as a key component in the identity and internal culture of any college or university.

With all that said, however, with good data for meaningful metrics, rankings can serve a very useful purpose in understanding what a program does well, as well as where it can improve. Recognizing this value, recently, Indiana University-Bloomington has partnered with Academic Analytics to better assess its programs and departments. The objective is not to create rankings merely to determine how we rank among our peers, but to better evaluate our strengths and weaknesses. The Academic Analytics database (AAD), according to their website, enables clients to make "comparisons at a discipline-by-discipline level as well as overall university performance." These comparisons are largely on four "primary areas of scholarly research accomplishment." These four areas are:

1. the publication of scholarly work as books and journal articles
2. citations to published journal articles
3. research funding by federal agencies
4. honorific awards bestowed upon faculty members.[1]

These data are collected on a school level but also on a person-to-person level. This allows for a level of depth that is both exhaustive and complex but with the potential to make better administrative decisions about a program or department.

The information provided through the AAD is useful in multiple ways. It serves a purpose as its own ranking system, allowing the campus to compare a program's or department's productivity, awards, and research related metrics with data from other internal units and universities. This information is also useful as a data set that can produce metrics beyond what is found by many rankings organizations.

Advances in technology have enabled the collection and analysis of data in ways that provide for better decision-making and evaluation of programs and departments. The business intelligence techniques utilized by Academic Analytics are one good example of how data can be used as an important tool when using rankings to assist with recruitment of faculty and to ensure graduate success. It must be understood, however, that while these metrics are useful inside of an institution for decision-making and evaluation based on data at the program or department level, they have less utility for comparing campuses or institutions.

Rankings by various media organizations are important for anyone in higher education, or wishing to pursue an undergraduate or graduate degree, yet, we must still always be cautious about how we use these types of rankings in decision-making. They must be taken seriously because they are indeed relied upon by many constituents, but we must also consider that these rankings are often inherently fickle, and rankings change from year-to-year in ways that

1 Academic Analytics (n.d.) What We Do. Retrieved from http://www.academicanalytics.com/Public/WhatWeDo

cannot be completely understood using the information presented in rankings publications. On the other hand, given the advances in technology and data collection, it is important for universities to recognize that there are now tools available to create rankings that do provide meaningful information for evaluation and assessment.

International Networks of Tokyo Institute of Technology

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Tokyo Institute of Technology (Tokyo Tech) is the best science and technology university in Japan. For more than one hundred thirty years Tokyo Tech's expertise in technology has been a driving force for change in our society. We place great emphasis on scientific collaboration in education and research with international institutions. We currently have more than a hundred academic exchange agreements with various universities from over thirty countries and are members of various international networks. Through our international agreements and networks we have more than twelve hundred international students from not less than seventy countries, totaling approximately 13 percent of the Tokyo Tech student body, one of the highest proportions in Japan. Tokyo Tech is striving to create an even more international environment, where more and more excellent students from all over the world can gather together for education and research and where an increasing number of Tokyo Tech students will go abroad to study. Every year around 40 students go abroad and study at partner universities based on our tuition waiver agreement programs.

There are two types of education for globally active students, "online" and "face to face." In our TAIST program, an international joint master's degree graduate program, which was established by Tokyo Tech in cooperation with leading Thai universities and the National Science and Technology Development Agency, we utilize online lectures. "Online" presents an easy and convenient way for communicating with remote students at low cost. However, Tokyo Tech places more emphasis on "face to face," because a real experience, even for a short-term exchange, encourages students to do a longer study abroad which significantly contributes to global collaboration. In recent years, Japanese society has been losing out on global activities, because the number of young students who go abroad to study has been decreasing. Tokyo Tech has long made efforts to develop international networks to help its students embrace globalization. We have several new programs to encourage this "face to face" type of globalization through international networks.

In 2009, Tokyo Tech proposed to establish a consortium of "Asian Science and Technology Pioneering Institutes of Research and Education (ASPIRE) League" with the aim of forming a hub for innovation in Asia through the advancement of science and technology and the development of human resources, thereby contributing to the realization of a sustainable world. The ASPIRE Forum is held annually and consists of a symposium, a student workshop and a meeting of the vice presidents. Researchers from the member universities give presentations at the symposium. The ASPIRE grant and satellite laboratory are provided by Tokyo Tech for collaborative research. Fostering the young talent who will be able to tackle important issues in today's global society is one of the League's objectives. In pursuit of this common goal, member universities are encouraged to provide educational opportunities to the students of other member universities. Exchanging students under the scheme of summer programs is one example of the League's collaborative efforts in education. In addition, the

ASPIRE League collaborates with the IDEA League, a network of leading universities of technology and science in Europe through various programs for students.

In 2012, Tokyo Tech established another far-reaching international network. We launched the Tokyo Institute of Technology International Education and Research (TIER) Program, supported by Japan's Ministry of Education, Culture, Sports, Science and Technology. TIER is Tokyo Tech's new initiative with the aims of promoting international educational exchange and cultivating world-class leaders. Tokyo Tech has garnered the cooperation of 18 world class universities in Asia, Europe and the United States in order to offer two individual programs within TIER, the "Tokyo Institute of Technology Research Opportunities Program (TiROP)" and the "TKT CAMPUS Asia Consortium," which provide excellent students from different countries the opportunity to collaborate with each other and our own students and faculty members at Tokyo Tech. The collaborative research and educational activities range from undergraduate student exchanges for pursuing individual research topics to joint supervisory exchange programs for graduate students. The program is unique in that it brings together numerous students from multiple cultural backgrounds for an intensive period of communication and cooperation, which they can then extend into a period of individual research under the guidance of a Tokyo Tech faculty member.

The third "face to face" network is based in school-to-school collaborations with our Graduate School of Engineering, the biggest graduate school at Tokyo Tech. It is the Asia-Oceania Top University League on Engineering (AOTULE) established in 2007 by the call of Tokyo Tech. The AOTULE is a regional league consisting of engineering faculties, staff, and students from eleven premier engineering and technological universities. The AOTULE promotes inter-university cooperation through joint programs including the holding of an annual Dean's meeting, staff meeting, and multi-disciplinary student conference. It also organizes short-term student exchanges and it aims to broaden participating faculty, staff, and students' perspectives through best practice sharing, research collaborations, and cross-cultural activities.

Member Universities of Each Consortium

Europe	Asia/Oceania	U.S.
Imperial College London △	KAIST ❍ △ ❄	Brown △
ETH Zurich ● △	Tsinghua University ❍ △ ❄	CalTech △
ParisTech ● △	Hong Kong University of Science and Technology ❍ △ ❄	Georgia Tech △
RWTH Aahen ● △	Nanyang Technological University ❍ △ ❄	MIT △
TU Delft ● △	National Taiwan University ❄	Stanford △
	University of Malaya ❄	UC Berkeley △
❍ ASPIRE League	Chulalongkorn University ❄	University of Minnesota △
● IDEA League	Bandung Institute of Technology ❄	University of Washington △
△ TIER	University of Melbourne ❄	University of Wisconsin △
❄ AOTULE	University of Auckland ❄	

Finally, since his appointment as Tokyo Tech President in October 2012, Professor Yoshinao Mishima has been leading Tokyo Tech's educational reforms and spearheading the internationalization of the Institute on several fronts. Tokyo Tech recognizes the fact that building international networks leads to the expansion of international exchanges in education and research and contributes to the creation of globally competitive engineers with the scientific and technological know-how, communication skills and international awareness to lead global efforts and contribute to the solutions to some of the world's most urgent problems.

Through this increase in international networks, Tokyo Tech aims to raise the percentage of our students who study abroad, and would eventually like all Tokyo Tech students to have an overseas experience. As further motivation to our students, U.S. Ambassador to Japan, John Roos spoke on campus in October 2012 and July 2013 and we also welcomed United States Secretary of State John Kerry on April 15, 2013. These events contributed to the international atmosphere at Tokyo Tech.

We believe that "face-to-face" communication in international environments helps our students gain the education and skills necessary to make globally-aware contributions to the world. Tokyo Tech seeks to expand and continue to engage in our collaborative activities working with our international networks.

Engaging with the new media— "How do I get retweeted by Obama?"

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> *On 16 May 2013, a University of Western Australia PhD student/University of Queensland research fellow, John Cook, tweeted reference to a project final report: "The overwhelming #consensus among scientists is rapid #climatechange is happening & man is the cause #TCP sks.to/tcppaper." The project report was accompanied by a YouTube summary. The Twitter post was immediately retweeted by, amongst others, Barak Obama who on that day had 31,541,507 followers. The requests for interviews by U.S. media outlets quickly followed.*

High bandwidth and the virtual universality of Internet access have spawned a media revolution. In addition to a proliferation of digital radio and television channels, the explosion of social media presents particular challenges for any organization wishing to develop a holistic strategy for engaging with 'the media'. As graduate education leaders, we ask ourselves, "Should I write a blog, get a Twitter feed and build a following, set up a Facebook page and amass 'likes' and 'friends', get a LinkedIn account and 'connect', produce and publish YouTube videos or even set up a 'channel', etc.?" It is tempting to plunge into each new medium, concerned to stay ahead of the wave lest failing to do so will mean failing to reach audiences and losing an edge to the competition. But what is the most effective way to share our messages with the public?

There are two essential elements to developing a strategy for engagement with the media. The first is to develop a good understanding of the messages that you wish to communicate and the intended recipients of those messages. The second is to develop an understanding of the nature of the media available for the transmission of messages, to recognize their effect on the message, and to accommodate.

Naturally there are many messages we may wish to send, but there are some we can probably all agree on. Much of our communication strategy is concerned with conveying the value proposition of graduate education. Our message is that graduate education is both a good private and a good public investment. Graduate education produces educated people who ask questions and have the skills to go about finding answers. More than this, the research conducted by graduate students, even while in graduate school drives innovation in every field of endeavor. The wider message is to promote the value of the research conducted in universities, and the structures that support it.

Who are the intended recipients of this set of messages? Increasingly, the intended receiver is the investing public—those who through their taxes, fees or endowments contribute to the funding of universities and/or who through their votes continue to promote higher education and publicly funded research as a community responsibility. We may also want to reach those who in the future will employ our graduate students and those who will themselves choose to

become graduate students.

Perhaps the most effective communication of these messages occurs where a connection is successfully made between the research done by graduate students and the publics' concerns. The best messages are those that appeal to the public imagination and/or seek to answer questions of current interest. Those from the U.K. and Australia will recognize the 'research impact/knowledge exchange' agenda here.

Traditionally, the transmission of messages about the value of research to a wider public audience is initiated via a press release. Professional journalists then take this as a basis for an article to appear in a magazine or journal. Follow up interviews initiated by a journalist may result in print, radio or TV pieces. It is assumed/expected that a large number of the target audience are tuned in and will get the message. The initial message is managed for the medium and for the intended audience, and control is generally in the hands of the journalist and editors. However, the current proliferation in available channels and the ability of the potential audience to select and individually tailor their own news feeds seriously challenges this model. Social media in particular allow for the unconstrained editing, reception, reconfiguring and retransmission of any message, indeed it may rely on this for its success. The university official research press release is not dead, but it is limited to a frame that assumes a controlled and orderly presentation of the message.

Harnessing the power of social media while at the same time providing some insurance against its ability to transform the message requires a dual strategy. The first is to empower a larger number of 'transmitters'—the goal is to encourage all researchers in the academy to take some individual responsibility for 'socializing' their research, to become their own press agent. The second is to provide a reliable and accessible source of an authorized version of the message.

Be your own press agent—the Three Minute Thesis™ competition (3MT)

The Three Minute Thesis™ (3MT) competition was developed at the University of Queensland in 2008, and in 2011 was extended to a trans-national competition (Australia, New Zealand, and Fiji).[1] PhD students are given just three minutes and allowed one slide (no animation, no props) to present their research project. The constraints provide a good framework for training particular skills very useful to engaging with the general media. These include the ability to produce a clear and concise summary of a research program and its results and to present this to a general audience in a way that captures their attention and interest. 3MT competitors are regularly interviewed on radio, and some have taken their presentations further. Two Australian 3MT contestants have gone on to win the PhD Comics 2 Minute Thesis competition. For example, Sarah Ciesielski's (University of Melbourne) 3MT presentation (Sept. 2012) is available on YouTube (1,635 views) alongside the animated PhD Comics version (60,343 views).[2] Sarah's presentation is linked on the official Melbourne School of Graduate Research Facebook page (927 likes) and she presents a promotional video on the University of Melbourne official YouTube channel (817 views).

A reliable source—The Conversation (theconversation.com)

The Conversation is an online news journal founded in March 2011 with the financial support

1 http://theconversation.com/a-thesis-in-three-minutes-making-research-accessible-10080
2 http://www.youtube.com/watch?v=eXsYJRbXrj0, http://www.phdcomics.com/tv/#024

of four Australian universities and the Commonwealth Scientific Research Organisation. It provides an open access platform for academic staff and graduate students to publish articles of general and topical interest. Editors work with the academic authors, who retain control of the article, to produce pieces describing research or providing expert opinion on issues of the day. The Conversation attracts over 500,000 unique views per month. For example, The University of Western Australia (UWA) has 116 published authors, the most widely read UWA article has 41,500 views, elicited 152 comments on the site, has been 'Tweeted' 33 times and linked on Facebook 38 times. The most widely read UWA PhD student author has 14,000 article views (and is ranked 14th of all UWA authors).

What new communication skills are required for the new media? The skills are not new skills, but perhaps we can do a better job in developing them. The skills required to deliver crisp, clean and catchy summary statements, as Twitter feeds or three minute YouTube videos are little different from the skills required in writing titles for papers, abstracts and project summaries (e.g. on grant applications) or pitching a research project in front of a conference poster. The added skills lie in understanding the new media and adapting messages to the new formats. In this domain, our graduate students may be our best teachers.

Biographical Sketches of Participants

Dr. Marie Audette

Marie Audette became Dean of the Faculty of Graduate and Postdoctoral Studies (FGPS) of Université Laval (Quebec City, Canada) in 2007 after having been director of the master and doctorate programs in Physiology-Endocrinology from the same university for several years. She is president of the Association of Deans of Graduate Studies from the Province of Quebec, ADÉSAQ, and Vice-President of the Canadian Association for Graduate Studies (CAGS). She obtained a PhD degree in Medical Biochemistry from Université Laval in 1984 and spent 3 years as a postdoctoral fellow at the Ludwig Institute for Cancer Research in Lausanne, Switzerland, where she studied cancer associated antigens. Back in her Alma mater in 1987 as a scholar from the Fonds de recherche en Santé du Québec, she joined the Laval University Medical Center and the department of Medical Biochemistry. She was member of several granting committees at the national and international levels. As Dean of Graduate and Postdoctoral Studies, she has a special interest in promoting excellence in supervision, by supporting faculty members in different ways. LavalFGPS has recently launched a community of practice of (CoP) of thesis directors, enabling its members to share best practices and learn from each other.

Dr. Robert M. Augustine

Robert M. Augustine serves as Dean of the Graduate School, Research, and International Students & Scholars at Eastern Illinois University (EIU) where he holds tenure as Professor of Communication Disorders and Sciences. He is the recipient of the EIU Distinguished Teaching Award, Dean's Award for Service, and EIU Technology Leadership Award. He served as chair of the Department of Communication Disorders and Sciences, as a Visiting International Scholar at Herzen State Pedagogical University of Russia, and as Interim Vice President for Academic Affairs for Technology. Dr. Augustine created the First Choice Graduate Programs initiative that won the Midwestern Association of Graduate Schools' Award for Excellence in Graduate Education in 2011. He guided development of the Integrative Graduate Studies Institute which won the ETS/CGS Award for Promoting Success in Graduate Education in 2011. Dr. Augustine's international contributions include launching the Global Ambassadors recognition program, creating study abroad scholarships, and guiding the first dual and joint degrees with international partners. He also developed the Dean's Award in recognition of the most outstanding grant proposals and the May Award for the highest achievement in granting. Dr. Augustine earned his PhD from Southern Illinois University at Carbondale. He holds the Departmental Distinguished Alumnus Award from Southern Illinois University and Illinois State University. He recently completed a three-year term on the Board of Directors of the American Speech-Language-Hearing Association. He was elected to the Board of Directors of the Council of Graduate Schools in 2010 and is currently Chairing the Board.

Dr. Brenda Brouwer

Brenda Brouwer is the Vice-Provost and Dean of the School of Graduate Studies at Queen's University having been appointed after serving in an interim capacity for two years following the completion a five year term as Associate Dean. She received a BSc in Kinesiology from the University of Waterloo, an MSc in Biomechanics from McGill University and a PhD in Neuroscience from the University of Toronto after which she accepted a faculty position at Queen's University. Dr. Brouwer is a full professor in Rehabilitation Science

with cross-appointments to the School of Kinesiology & Health Studies and the Centre for Neuroscience Studies. She maintains an externally supported research program focussed on the biomechanical, metabolic and physical demands of mobility in healthy aging and aging in the presence of stroke. Motor control and cortical reorganization following stroke are key foci of her research. She has supervised over 37 research master's and doctoral students to completion and several post-doctoral fellows. She has received awards for excellence in teaching and research.

Dr. Hans-Joachim Bungartz

Hans-Joachim Bungartz is a full professor of informatics and mathematics at Technische Universität München (TUM), where he holds the Scientific Computing chair in the informatics department. Dr. Bungartz earned degrees in mathematics and informatics, a PhD in mathematics, and a habilitation in informatics, all from TUM. He became managing director of the Bavarian Consortium on HPC (1996), associate professor of mathematics at Universität Augsburg (2000), full professor of informatics at Universität Stuttgart (2001), and returned to TUM in 2005. Since 2008, he has also been affiliated with the Dept. of Mechanical Engineering of the University of Belgrade. Since 2010, Dr. Bungartz has served as Dean of Academic Affairs. Currently, Dr. Bungartz is also Vice-Dean, spokesman of all Deans of Academic Affairs, and member of TUM's Extended Executive Board. In April, Dr. Bungartz was appointed TUM Graduate Dean, heading the TUM Graduate School.

Dr. Bungartz has served or serves on several editorial boards, and he was a member of the scientific directorate of Leibniz Institute for Informatics Schloss Dagstuhl. Since 2006, he has been chairman of the Commission for IT Infrastructure of the German Research Foundation (DFG). Furthermore, he is involved in national and international research project review and advisory board activities in CSE and HPC. In 2011, Bungartz was elected chairman of the German National Research and Educational Network (DFN). Finally, Dr. Bungartz is a board member of Leibniz Supercomputing Centre (LRZ), one of three national HPC centres.

His research interests are where CSE, scientific computing, and HPC meet. He works on parallel numerical algorithms, hardware-aware numerics, high-dimensional problems, and aspects of HPC software, with fields of application such as CFD. Most of his past and present projects—nationally or internationally funded—have been interdisciplinary ones. As an example, he coordinates DFG's new Priority Program Software for Exascale Computing.

Professor Kyung Chan Min

Kyung Chan Min is the Chairman of the Council for Promotion of Basic Science, Ministry of Science, ICT and Future Planning. He was the Chairman of the Special Committee for Higher Education in the Presidential Advisory Council on Education, Science & Technology of Korea during the period 2008-2012. Moreover he was Chairman of the National Policy Advisory Committee for Ministry of Education, Science & Technology from 2008 to 2010. He also served as President of the Korea Association of Liberal Education and President of the Korea Association of Teaching and Learning Centers for University Education.

Professor Min has various administrative experiences in Yonsei University, which he joined in 1982 as a Professor of Mathematics. He has served as Dean of Admissions, Dean of Faculty, Dean of University College and Dean of Graduate School in Yonsei University. He is now Chairman of the Committee for the Yonsei Strategic Initiative. He has a Bachelor of Science from Yonsei University, Korea and a Master of Science, a Ph.D. in Mathematics from

Carleton University, Canada.

Professor Min has been recognized as a distinguished mathematician in the field of topology and fuzzy mathematics. He served as President of the Korean Mathematical Society and President of the Korea Fuzzy Logic and Intelligent Systems. Moreover he served as an Executive Board member and a Vice President of the International Fuzzy Systems Association (IFSA). He is now an associate editor of the International Journal of Fuzzy Systems.

Professor Min is also an influential scholar in the science community in Korea. He was the Representative of the Citizen's Coalition of Scientific Society (CCSS) from 2008 to 2011. He is now a member of Scientific Advisory Board of the Institute for Basic Science, Korea and a member of the Board of Directors of the POSCO TJ Park Foundation.

Ms. Yufang Chen

Ms. Yufang Chen is a staff member at the Center for Teaching and Learning Development, Xiamen University. After graduating from Imperial College London with a Bachelor's degree in Biochemistry with Management, she further pursued her studies at the London School of Economics and Political Science, earning a master's degree in Management, Organizations and Governance.

Before coming to Xiamen University, Ms. Chen was appointed Media Director of the China Centre for Financial Research (CCFR) at Tsinghua University, responsible for all business related to media development and promotion for all programs at CCFR. Her responsibilities included coordinating the release of news, statements and other information to the press, such as Thomson Reuters and Xinhua News Agency, and liaise with world renowned universities, including Harvard, Massachusetts Institute of Technology, the London School of Economics for joint programmes. Ms. Chen also worked for CCTV NEWS, China's only national English news Channel, as a reporter before moving to Tsinghua University.

Professor Alan Dench

Alan Dench is Dean of Graduate Research and Postdoctoral Training, and Winthrop Professor in Linguistics at the University of Western Australia (UWA). He also chairs the University's Board of Studies for the Bachelor of Arts degree.

His principal area of research is the primary documentation, description and comparative historical reconstruction of Australian Aboriginal languages. He has written grammatical descriptions of three languages of the Pilbara region of Western Australia—Panyjima, Martuthunira and Yingkarta—and is continuing work on a detailed description of Nyamal. His current research program, with colleagues in Australia, France, Belgium and the UK, is focussed on the investigation of the semantics of tense, aspect, modality and evidentiality in Australian languages.

Past roles at UWA have included Head of the School of Humanities, Executive Dean of the Faculty of Arts, and Chair of the University Animal Ethics Committee. He has played a role in the design and teaching of the UWA undergraduate Linguistics major and has supervised a number of higher degree research students, most working on descriptions of endangered indigenous languages of Australia, Indonesia or the wider Indo-Pacific region.

He has a bachelor's degree with Honours in Anthropology from UWA, and master's and PhD degrees in Linguistics from The Australian National University. He is currently a member of the Executive Committee of the International Society for Historical Linguistics,

a member of the Australian Institute of Aboriginal and Torres Strait Islander Studies, and a Fellow of the Australian Academy of the Humanities.

Dr. John (Jay) Doering

John (Jay) Doering, PhD, P.Eng., FCSCE, FEC is Vice-Provost (Graduate Education), Dean (Graduate Studies), and Professor of Civil Engineering at the University of Manitoba, Winnipeg, Manitoba, Canada.

Dr. Doering holds a first-class honours BSc in Civil Engineering from Queen's University, Kingston, Ontario, Canada and was the recipient of a Natural Sciences and Engineering Research Council of Canada (NSERC) Centennial Scholarship, which he used to complete a PhD in Coastal Processes at Dalhousie University. He then accepted an NSERC Visiting Fellowship at the National Water Research Institute in Burlington, Ontario, Canada, before starting as a faculty member at McMaster University. In 1993 Dr. Doering moved to the University of Manitoba where he established the Hydraulics Research and Testing Facility which facilitated the successful supervision of a significant number of master's and doctoral students in the areas of experimental hydraulics, coastal hydraulics, and river ice processes. He has published extensively in each of these areas. In 2001 Dr. Doering became Head of Civil Engineering, then moved to his current position in July 2005. Dr. Doering has been actively involved in the engineering profession and is the Past-President of Western Canadian Deans of Graduate Studies (WCDGS), and the Past-President of the Canadian Association for Graduate Studies (CAGS).

Dr. Andreas Frijdal

Dr. Andreas Frijdal studied chemistry (RUCA) and economics at the Free University Brussels (VUB) and obtained his PhD in Economics there. He was a member of the Economics Department of the Free University, later setting up the university's R&D sector and specializing in research management. In 1985 he moved to the European University Institute, Florence (Italy), where he was responsible for research management before becoming Director of the Academic Service in 1988. During this time he wrote various articles and reports on research management, doctoral education and the development of European Studies programmes for the European Union and other governmental bodies. Over the last decades he has focused on the training of researchers and postdocs in his function as responsible for the implementation of one of the largest doctoral and postdoctoral programmes in the social sciences in the world.

He is a member of the Advisory Board of the Center for Innovation and Research in Graduate Education of the University of Washington, Seattle, member of the Conseil and the Comité scientifique de la Fondation Jean Monnet pour l'Europe and the International Advisory Board of the European University at Saint Petersburg. He was one of the founding members of the Steering Committee for the EUA Council for Doctoral Education.

Dr. Noreen Golfman

Noreen Golfman is a professor of English and Dean of Graduate Studies at Memorial University of Newfoundland. She oversees more than 110 graduate degree programs, many of which are interdisciplinary. In 2010, the School was honoured by the Canadian Association for Graduate Studies (CAGS) and the Educational Testing Service (ETS) for its outstanding contribution in graduation admissions practices, earning the first ever national award of its

kind. The award acknowledged innovations in electronic admissions and thesis preparation, and a suite of digital applications to increase efficiency and diminish the carbon footprint.

Dean Golfman was President of the Canadian Federation for the Humanities and Social Sciences (CFHSS) for four years. The CFHSS is a lobby that represents over 80,000 Canadian scholars, graduate students and post-doctoral fellows. She is currently President of the Northeastern Association of Graduate Schools (NAGS) and President of the Canadian Association of Graduate Schools (CAGS), and she is Chair of the Board of Friends of Canadian Broadcasting, an advocacy organization that serves the interests of the public broadcasting and telecommunications system.

In addition to her scholarly contributions on film and literature, Dean Golfman has been writing on the arts in more popular venues, maintaining several weekly columns in newspapers and magazines. She has also been a freelance commentator, reviewer and performer with CBC Radio and Television for over twenty years. For over three years she has been writing a weekly blog—Postcards on the Edge—largely dedicated to graduate studies concerns. She tweets regularly.

Professor Gu Jibao

Gu Jibao is Vice Dean of the Graduate School of the University of Science and Technology of China (USTC), and a professor in the Management School of USTC. He received a bachelor of law degree and master's of law degree from Wuhan University in 1991 and 1994, and received his doctoral degree in management science from USTC in 2004.

Professor Gu has done various administration service jobs at USTC. From 2000 to 2004, he was the vice director of the MBA center, accountable for the administration of cultivation. From 2005 to 2008, he was the director of the MBA center, and was accountable for the whole administration of the center. Since 2009, he has served as the Vice Dean of the Graduate School, and is responsible for the recruitment, admission and cultivation of graduate students of USTC.

Professor Gu teaches undergraduate and graduate courses such as strategic management, business model innovation, management consultation, etc. His research is about creativity, innovation and graduate education. He has published about 30 papers in various academic journals.

Dr. Julia Kent

Julia Kent (PhD, Johns Hopkins University) is Director of Communications, Advancement and Best Practices at the Council of Graduate Schools (CGS). At CGS she has conducted research on a broad range of topics in graduate education, including quality and accountability, interdisciplinary programs, professional doctorates, research ethics and integrity, career outcomes, Preparing Future Faculty, and international collaborations. She has co-authored (with Daniel Denecke) Research and Scholarly Integrity in Graduate Education: A Comprehensive Approach (2012), Joint Degrees, Dual Degrees, and International Research Collaborations (2010), and Preparing Future Faculty to Assess Student Learning (2011), a report on CGS's recent initiative on this topic. Currently she is co-Principal Investigator for a CGS grant funded by the National Science Foundation, "Modeling Effective Research Ethics Education in Graduate International Collaborations: A Learning Outcomes Approach." Dr. Kent also oversees CGS's Strategic Leaders Global Summit, an annual forum that has brought together leaders in graduate education from almost 30 countries to discuss international issues in graduate education and research and has served as Managing Editor of

the summit proceedings from 2009 to the present. Before arriving at CGS, she was Assistant Professor of English at the American University of Beirut (AUB), where she served on the Executive Committee of the Center for American Studies and Research, a research center that draws visiting scholars from North America, Europe, and the Middle East.

Professor Ernő Keszei

Ernő Keszei was born in Jákfa (Hungary) in 1951. He graduated as a chemist at Eötvös Loránd University, Budapest and received his PhD from the same university in Physical Chemistry in 1978. He has had a permanent position there ever since, but spent four years as a visiting scientist at Sherbrooke University, Québec, Canada, and participated in a common project for two years at the University of California Los Angeles, as well as in several bilateral scientific cooperations within Europe. He acted as the head of the Department of Physical Chemistry at Eötvös Loránd University from 1993 to 2007, and later as the director of the Institute of Chemistry. He played an active role in the formation of the Doctoral School for Chemistry in 1994 and its reorganisation in 2001. He was an elected member of the Senate at Eötvös Loránd University for 10 years. He served as the Vice-Rector for Science, Research and Innovation at Eötvös Loránd University from 2010 to 2013. He is the head of the National Bologna Board in Hungary and represents the country in the Bologna Follow-up Group (BFUG) since 2010, and acted as co-chair of the BFUG in 2010 and 2011.

Dr. Barbara Knuth

Barbara A. Knuth was appointed Vice Provost at Cornell University in April 2010 and Dean of the Graduate School in July 2010. She oversees nearly 100 graduate fields that include about 1,800 graduate faculty across ten colleges and schools, more than 5,100 graduate and professional students, and over 500 post-docs. She served previously as Senior Associate Dean of the College of Agriculture and Life Sciences at Cornell from 2007-2010, and Chair of the Department of Natural Resources from 2002-2007. She was the elected Speaker of the Cornell University Faculty Senate 2005-2007. Under Dean Knuth's leadership, the Graduate School is enhancing its professional development program to focus on supporting students to work effectively with their graduate committees, improve writing skills and spark the creation of writing communities on campus, and to foster transferable skills relevant to academic and non-academic career paths. The Graduate School is developing and providing direct programming for students and post-docs and partnering with other key units on campus including the Center for Teaching Excellence and Career Services, and is part of the multi-institution Center for the Integration of Research, Teaching, and Learning (CIRTL). The Graduate School is increasing its focus on inclusion through strategic support to graduate fields' efforts in recruitment, retention, and academic success for a diverse graduate student population. Under her leadership, the Graduate School restructured its staff, launched a new web site, improved its approach to information technology, and increased its media presence. All graduate fields have developed explicit plans for assessing learning outcomes for master's and doctoral education and report biennially on their assessment efforts and lessons learned. She serves on the Ocean Studies Board of the National Academies and is a past president of the American Fisheries Society.

Dr. Eduardo Kokobun

Eduardo Kokubun graduated from the University of São Paulo (USP), Brazil, in 1980 with a

degree in physical education. He received his master´s degree in Physical Education in 1984 and PhD in Human Physiology in 1990, at the USP. He started his academic career in the Department of Sports, School of Physical Education and Sport – USP in 1980. He moved to the Department of Physical Education, Bioscience Institute – UNESP, Rio Claro, Brazil in 1990, teaching and researching in Exercise Physiology and Physical Activity and Health as full professor. He is currently Vice-President for Graduate Studies at the Sao Paulo State University-UNESP.

He was Chairperson of the Committee for Evaluation of Physical Education, Phonoaudiology, Physical Therapy and Occupational Therapy Graduate Courses in Brazil – CAPES, a Brazilian Federal Agency for Support and Evaluation of Graduate Education (2002 – 2007).

Dr. Li Jing

Dr. Li Jing received his PhD degree from Nankai University in 1988. He went to the University of Oviedo (Spain) as a postdoctoral researcher during 1992-1994, and visited McGill University as a Visiting Professor in 2002. He became a full Professor of chemistry at Nankai University in 1996. He was the head of State Key Laboratory of Elemento-organic Chemistry during 2001-2004. In 2004 he became the Vice-Dean of Graduate School of Nankai University.

Professor Nick Mansfield

Nick Mansfield is Dean of Higher Degree Research and Professor of Critical and Cultural Studies at Macquarie University in Sydney. As Dean, his responsibilities include the academic content and quality of all higher degree research and research training programs at the doctoral and master's level. He is also responsible for the quality of the supervision process and supervision accreditation, admissions, inductions and scholarship assessment, the thesis examination process, HDR policy and student pastoral care. He is a member of the Executive of the Council of Deans and Directors of Graduate Research. His research is in the area of cultural theory, especially the work of Jacques Derrida in relation to sovereignty, subjectivity, war and climate change.

Professor Toshio Maruyama

Professor Toshio Maruyama is currently Executive Vice President for Education and International Affairs, Tokyo Institute of Technology (Tokyo Tech) and a professor in the Graduate School of Engineering and the School of Engineering. He specializes in materials science with an emphasis on material processing, functional material and physical properties.

Maruyama graduated from the School of Engineering at Tokyo Tech in 1972. He earned a master's degree in engineering in 1974 and a doctoral degree in engineering in 1977 at Tokyo Tech.

Following a year as a Research Associate in the Department of Materials Science and Engineering, Massachusetts Institute of Technology, U. S., he launched his career in Japan in 1978 as an Assistant Professor in the Research Laboratory of Engineering Materials at Tokyo Tech, and became an Associate Professor in the Department of Metallurgical Engineering in the School of Engineering at Tokyo Tech in 1987. He was promoted to full professor of the Department of Metallurgical Engineering at Tokyo Tech in 1996, and later

became a professor of the Department of Metallurgy and Ceramics Science at Tokyo Tech. From October 2011 to October 2012, before being appointed Executive Vice President for Education and International Affairs, Maruyama served as a Dean of the Graduate School of Engineering and the School of Engineering at Tokyo Tech.

Maruyama has received many awards for his outstanding research achievements from international and domestic academic societies.

Dr. Liviu Matei

Liviu Matei is the Senior Vice-President of Central European University (CEU) and a Professor of higher education policy. He coordinates CEU's complex activities in the area of higher education policy. Previously, he was a faculty member at Babes-Bolyai University Cluj, worked as a director general for international relations at the Romanian Ministry of Education, consulted for UNESCO, OSCE, and the Council of Europe. He conducts work as a higher education expert for the European Commission and participates frequently in policy research projects of the European University Association. Matei is a member of the editorial board of the Journal of the European Higher Education Area, serves on the Board of Trustees of the American University of Central Asia and on the Advisory Board of the Open Society Foundations' International Higher Education Support Program. Currently he chairs the GRE European Advisory Council. Matei studied at the University of Bucharest (PhD in sociology of higher education) and Babes-Bolyai University Cluj (BA in philosophy and history). He benefited from fellowships at the Institut Supérieure de Formation Sociale et Communication Bruxelles, New School University, Université Paris Nanterre, Salzburg Seminar, and Université de Savoie.

Ms. Yuko Mitsuhashi

Yuko Mitsuhashi has served as group leader of the Program Promotion Group, Leading Graduate Schools Support Office, Tokyo Institute of Technology (Tokyo Tech) since April 2013. Her group is in charge of newly established programs funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Leading Graduate Schools, which aim to guide excellent doctoral students to become farseeing and creative leaders who will be widely and globally active in industry, government and academia.

Ms. Mitsuhashi launched her career at Tokyo Tech after earning a bachelor's degree in law from Meiji Gakuin University in 1991. She was a longtime member of the Personnel Affairs Division at Tokyo Tech. She was also engaged in student affairs for the Interdisciplinary Graduate School of Science and Engineering from April 1998 to March 2001 and worked for the Graduate School of Science from April 1993 to March 1996 and April 2001 to March 2003. Before assuming her current position, she was group leader of the Evaluation Group, Evaluation and Public Relations Division at Tokyo Tech from April 2010 to March 2013.

Professor Tetsuya Mizumoto

Professor Tetsuya Mizumoto became Vice President for Education at the Tokyo Institute of Technology (Tokyo Tech) in October 2012 and concurrently continues serving as a professor in the Graduate School of Engineering and the School of Engineering. His research fields are applied optics, quantum optics, photonic circuits, and information and communication engineering.

He was awarded a Bachelor of Engineering degree in Electrical and Electronic Engineering in March 1979, a Master of Engineering degree in Physical Electronics in March 1981, and a Doctor of Engineering degree in Electrical and Electronic Engineering in March 1984, all from Tokyo Tech.

He began working for Tokyo Tech in April 1984 as a research associate in the Faculty of Engineering and became an associate professor in March 1987. He was promoted to full professor with the Graduate School of Engineering in April 2004. From April 2010 to October 2012, he served as director of the Center for Research and Development of Educational Technology at Tokyo Tech.

Professor Mizumoto was awarded the Institute of Electronics, Information and Communication Engineers (IEICE) Achievement Award for "Pioneering work on optical nonreciprocal circuits" in May 2012, the Institute of Electrical and Electronics Engineers (IEEE) Fellow grade for "Contributions to investigations of waveguide optical nonreciprocal devices for optical communications" in January 2012, and IEEE Photonics Society Distinguished Lecturer Awards from July 2009 to June 2011.

Professor Shireen Motala

Professor Shireen Motala held the position of the Director of the Education Policy Unit, Wits University from 1999 to February 2010. Her academic qualifications are BA (University of Durban-Westville), BSocSci Honours (University of Cape Town), MA (University of Warwick), PGCE (University of London), and PhD (Wits University). She sits on the Board of a number of policy research organisations including the Centre for Education Policy Development and the South African Institution for Distance Education. She is currently Chairperson of the Education Policy Consortium which brings together policy research entities nationally. She was also the Chairperson of the UNESCO South African Commission from 2002 to 2006 and was the MEC appointee on the Gauteng and Training Council from 2002 to 2005. She has worked extensively in research and has provided leadership for regional and international partnerships which have led to collaborations with universities across Africa and with northern partners. These include providing leadership to the Consortium on Transition, Equity and Access in Education, a multi-year research programme with the universities in Sussex, India, Bangladesh and Ghana. She has also been responsible for significant fund raising and for large research grants for the EPU, the most recent of which is large scale funding from the Royal Netherlands Dutch Embassy for a research programme on Literacy, Numeracy and Quality in South African Schools. Her research record is substantial and includes books, editorship of local and international journals and chapters in books. She has vast experience in all aspects of research including research mentorship, management of research teams, quality assurance and working with peers in the research community. She has also served on various committees at Wits University including the Faculty Research Committee, the School of Education Executive, the School of Education Research Committee, the Committee on internationalisation in the Faculty, and the Honorary Degrees Committee.

In March 2010, Shireen Motala was appointed as Director of the Postgraduate Research Centre: Research and Innovation at the University of Johannesburg. Her responsibilities include leading the university wide strategy for improving enrolment at a postgraduate level, providing research support for postgraduate students and ensuring that throughput improves in the institution. In September 2010 she was appointed Associate Professor in the Faculty of Education, University of Johannesburg.

Professor Beate Paulus

Professor Beate Paulus is a professor of Theoretical Chemistry at the Freie Universität (FU) Berlin. In addition to research and teaching, she is the head of the Dahlem Research School of Molecular Science (DRS MS), the first graduate school founded by Prof. Hans-Heinrich Limbach at the FU Berlin more than a decade ago. In the last years the DRS MS has evolved into the umbrella under which various graduate programs for chemistry, physics and biochemistry are unified. On the other hand the joint graduate program of the FU Berlin, the Dahlem Research School provides a roof for graduate programs of all fields. This model allows general topics like advisory teams and soft skill education to be handled efficiently, and the differences, for example, between a PhD in science and one in the humanities can be treated in the more specialized programs like the DRS MS.

Professor Nirmala Rao

Nirmala Rao is a Professor, Faculty of Education and Associate Dean & Director of Graduate Studies, Graduate School, The University of Hong Kong. She is a Developmental and Chartered (Educational) Psychologist, recognized internationally for her work on early childhood development, and child development and education. Her research program concerns the influences of home, preschool and policies on early child development in Asian contexts. Her work is underpinned by the belief that systematically conducted empirical research should inform educational and social policy relevant to children and their families, and by a commitment to equity, particularly in relation to access to education for children who are disadvantaged and girls. Recognition of her research is reflected in her publications and in requests to provide technical expertise and consultancy to the UN and its associated agencies, as well as other invitations to serve on high-level committees concerned with child development in the developing world. She also plays leadership roles in international professional organizations that aim to promote the well-being of young children through research and advocacy efforts.

During her tenure with the University, she has been Deputy Head of the Department of Education (1999-2002); Associate Dean, Faculty of Education (2002-2005); Acting Dean, Faculty of Education (2006-2007); and Acting Chairperson of the Board of the Faculty of Education (2008-2009). She has been Associate Dean of the Graduate School and Chairperson of the Board of Graduate Studies since 2010.

Mr. Kurt Sanford

Kurt Sanford was named CEO of ProQuest, LLC in July 2011. Previously, Mr. Sanford was President, Global Operations for the global legal business of LexisNexis, with responsibility for global oversight and management of all technology functions, editorial and production, and customer support. Other positions held by Mr. Sanford at LexisNexis during his 14-year tenure include CEO of U.S. Corporate and Public Markets, CEO of Asia Pacific, Senior Vice President of Large Law Firm Markets in the U.S., as well as other strategic and business development roles within the company.

Before joining LexisNexis, Mr. Sanford was a consultant at Bain and Company, the global business strategy consulting firm, where he specialized in assisting technology, telecommunications, consumer products and financial service firms. Prior to that, he was a Vice President of a diversified financial services firm and also served on active duty in the U.S. Army as a Captain and member of the Judge Advocate General's Corps.

Mr. Sanford earned an MBA, with distinction, from The Wharton School of the University of Pennsylvania, and received his JD, with honors, from Suffolk University Law School in Boston, MA. He also graduated with a BA in Economics from the University of Notre Dame.

Dr. Zlatko Skrbis

As Pro Vice-Chancellor (Research and Research Training), Professor Zlatko Skrbis is responsible for the Monash University Institute of Graduate Research, which administers the University's doctoral programs including the new Monash PhD and research master's degrees, postgraduate research scholarships and research training activities. He is also responsible for enhancing recruitment and the quality of graduate research candidates, and has oversight of early career research university-wide initiatives.

Professor Skrbis has an established international reputation in graduate training. Before joining Monash, he was Dean of The University of Queensland's Graduate School and was involved in research training initiatives in China, the European Union, Indonesia and Latin America.

He is a Professor of Sociology with a distinguished international research profile and is renowned for his work in the fields of migration, cosmopolitanism, social theory and life-course studies.

He is currently the Convenor of the Universities Australia Council of Deans and Directors of Graduate Research and has an extensive portfolio of past professional leadership involvement nationally and internationally including Professorial Fellowships at The University of Warwick (2008) and The University of Manchester (2010).

Professor Skrbis holds undergraduate degrees in philosophy and sociology of culture from the University of Ljubljana and a PhD in sociology from Flinders University in South Australia.

Dr. Mark J. T. Smith

Mark J.T. Smith received a BS degree from MIT and the MS and PhD degrees from Georgia Tech, all in electrical engineering. He joined the electrical engineering faculty at Georgia Tech in 1984 and later served as the Executive Assistant to the President of the Institute from 1997 until 2001. In January, 2003, he joined the faculty at Purdue University as Head of the School of Electrical and Computer Engineering. Presently he serves as Dean of the Graduate School at Purdue and holds the Michael & Katherine Birck endowed professorship.

Dr. Smith is a Fellow of the IEEE and former IEEE Distinguished Lecturer in Signal Processing. He is the co-author of two introductory books: Introduction to Digital Signal Processing and Digital Filtering. He is also co-editor of the book Wavelets and Subband Transforms: Design and Applications, and co-author of the textbook A Study Guide for Digital Image Processing.

Dr. Smith is a past-president of the Electrical and Computer Engineering Department Heads Association (ECEDHA), a member of the CSG Board of Directors, and a member of the National Academies Board of Army Science and Technology.

In addition to professional service, teaching, and research, Dr. Smith's past includes athletic training and competition in the sport of fencing. He was National Champion of the United States in 1981 and 1983 and a two-time member of the U.S. Olympic Team in 1980 and 1984.

Professor Nicky Solomon

Professor Nicky Solomon is Dean of the Graduate Research School at the University of Technology, Sydney. As Dean, Professor Solomon has overall leadership and management of research degree students across the university. Her role focuses on improving the quality of doctoral education so that research graduates make significant contributions to knowledge in their disciplinary areas, but also so that graduates have well developed research skills to help them with their career choices.

Professor Solomon's research spans a number of areas: workplace learning, interdisciplinary research, as well as on changing professional and pedagogical practices through the ongoing influence of digital information and communication developments. Her current research project, funded by the Australian Research Council, focuses on the changing practices of health professionals in primary health care settings.

Professor Solomon is Chair of a Steering Group of a consortium of Australian and New Zealand universities for fIRST (for Improving Research Supervision and Training). fIRST is an online site that provides access to a range of resources to help universities and individual supervisors improve the quality of their postgraduate research education. In addition Professor Solomon is a member of the team undertaking research, funded by the Office of Learning & Teaching (Australian Government), on the 'emerging role of research education coordinators'.

Dr. Debra W. Stewart

Debra W. Stewart became President of the Council of Graduate Schools (CGS) in July 2000. She holds degrees from Marquette University, University of Maryland, and the University of North Carolina, Chapel Hill. In 1975 she joined the North Carolina State University faculty and was professor of Political Science and Public Administration from 1984 to 2000. In 1983 she became Associate Dean of the Graduate School at North Carolina State and Dean of the Graduate School in 1988. In 1994 she served as Interim Chancellor at the University of North Carolina, Greensboro. Prior to CGS, she was Vice Chancellor and Dean of the Graduate School at North Carolina State University.

Stewart's service to graduate education includes chairing the Graduate Record Examination Board, the Council on Research Policy and Graduate Education, the Board of Directors of Oak Ridge Associated Universities, and the Board of Directors of CGS. She also served as vice chair of the ETS Board of Trustees, Trustee of the Triangle Center for Advanced Studies, and member of the American Council on Education Board and several National Research Council Committees. In November 2007, her leadership in graduate education was recognized by the Université Pierre et Marie Curie with an honorary doctorate. Her alma mater, the University of North Carolina Chapel Hill, honored her in October 2008 with the Distinguished Alumna Award. In May 2013, Loyola University at Chicago presented her with a Doctor of Humane Letters, honoris causa.

Stewart is author, coauthor, and editor of books and numerous scholarly articles on administrative theory and public policy. She lectures nationally and internationally on graduate education issues and challenges. Her research focuses on ethics in managerial decision-making.

Dr. Bernard C. Y. Tan

Bernard C. Y. Tan is Vice Provost (Education) at the National University of Singapore (NUS).

Prior to his current appointment, he was Associate Provost (Undergraduate Education) (2009-2012), Executive Council Chairman of the NUS Teaching Academy (2009), Head of the Department of Information Systems (2002-2008), and Assistant Dean of the School of Computing (2000-2002). Currently, he is the Runme Shaw Professor of Information Systems at NUS and Honorary Distinguished Professor at Fudan University. He has been a Guest Professor at Renmin University of China (2009-2012), a Visiting Scholar at Stanford University (1996-1997), and a Visiting Scholar at the University of Georgia (1992). He was the 15th President (2009-2010) and an Asia-Pacific Council Representative (2004-2006) of the Association for Information Systems. He is a Fellow of the Association for Information Systems. He has served on the editorial boards of major international journals such as MIS Quarterly (Senior Editor), Journal of the AIS (Senior Editor), IEEE Transactions on Engineering Management (Department Editor), Management Science (Associate Editor), ACM Transactions on Management Information Systems (Associate Editor), and Journal of Management Information Systems (Editorial Board Member). He has also served on the conference committees and program committees of major international conferences in the field of information systems. He has won university research awards and university teaching awards at NUS. He is a Principal Investigator of the Centre of Social Media Innovations for Communities (COSMIC). His current research interests are social media, virtual communities, and Internet commerce.

Professor Zaidatun Tasir

Zaidatun Tasir is a Professor of Educational Technology at the Department of Educational Science, Maths and Creative Multimedia, Faculty of Education, Universiti Teknologi Malaysia (UTM). She is also a Dean of School of Graduate Studies, UTM and a research group leader of Creative and Innovative Technology in Education (CITE) under k-Economy research alliance. Prior to that, she was a Deputy Dean (Social Science) of the School of Graduate Studies (2009 – 2010), Deputy Dean (Postgraduate Studies & Research) (2008 – 2009), Head of the Department of Postgraduate Studies (2007 - 2008), and Information Technology Manager (2004 – 2007). She obtained her first degree, BSc Comp. with Edu. (Math) (Hons.) from UTM (1995), M Ed (Educational Media Computers) from Arizona State University, USA (1998), and PhD (Educational Technology) from Universiti Teknologi Malaysia (2002). Her research interests and expertise include Design and Development of Computer and web-based Instructions, Multiple Intelligence through computer-based instruction, Problem-based learning through technology, Social Networking Tools in Education, and the Online Social Learning Model.

Dr. Lisa A. Tedesco

Lisa A. Tedesco joined Emory University in May 2006 as Vice Provost for Academic Affairs- Graduate Studies and Dean of the James T. Laney School of Graduate Studies. She is a professor of Behavioral Sciences and Health Education in the Rollins School of Public Health.

Under Dr. Tedesco's leadership, the Laney Graduate School is emphasizing opportunities for interdisciplinary study and professional preparation. New programs range from doctoral degree tracks that train students in both laboratory and population sciences, a master's program that trains 21st century sustainable development professionals, and certificate programs in translational research and interdisciplinary studies in mind, brain and culture.

In 2009, Dr. Tedesco was elected to the Board of Directors of the Council of Graduate Schools and served as Chair of the Board in 2012. She is a member of the Executive Committee of the AAU Association of Graduate Schools, and is serving as President-elect in 2013. During 2012-2013 she is serving as Chair of the GRE Board.

As a health psychologist, Dr. Tedesco is interested in how people think about and act to prevent illness and promote well-being. Her research has focused on cognitive behavioral enhancement of oral health status, relapse prevention, and stress, coping and oral disease. She has written and worked institutionally on matters related to curriculum change, inquiry-based learning and teaching, faculty development, and diversity.

Dr. Tedesco earned her doctorate in Educational Psychology from the University at Buffalo, State University of New York.

Professor Gerard van der Steenhoven

Professor Gerard van der Steenhoven is Dean of the Faculty of Science and Technology at the University of Twente (since 2008). Moreover, he is Dean of the university-wide Twente Graduate School (since 2009). Van der Steenhoven was educated at the Vrije Universiteit in Amsterdam, where he obtained a PhD in experimental nuclear physics in 1987. After a postdoc at the Massachusetts Institute of Technology, Van der Steenhoven was appointed in 1989 at the National Institute for Particle Physics (NIKHEF) in Amsterdam where he has been leading various international projects, in particular in the domain of quark-gluon physics (with part of his group based at DESY, Hamburg) and astroparticle physics (with part of his group based in Marseille). He was appointed as Professor of Physics at the University of Groningen in 2000. Van der Steenhoven is an important representative of Dutch science, as a scientist and policy maker. He is founder and first chairman of the Committee for Astroparticle Physics in The Netherlands (2004-2008), chairman of the Netherlands' Physical Society (NNV, since 2007), and president of the board of the Dutch Research School on Process Engineering (OSPT, 2008-2011). Moreover, he is chairman of the scientific advisory board of the FOM Institute DIFFER (Dutch Institute for Fundamental Energy Research, since 2009), and member of the board of the recently started foundation on liquid natural gas research (LNG TR&D). Van der Steenhoven is also active in the local Science Café, and as a board member in various organizations with an educational or cultural mission.

Dr. James C. Wimbush

Dr. James C. Wimbush is Dean of the University Graduate School, Vice President for Diversity, Equity, and Multicultural Affairs, and Professor of Business Administration at Indiana University (IU). As dean, he oversees and works to promote graduate master's and doctoral programs on Indiana University's eight campuses.

Nationally, he works to advance graduate education. He is the former Chair of the Board of Directors of the GRE; Chair-elect of the Council of Graduate Schools' Board of Directors; and, a member of the Executive Committee of the AAU's Association of Graduate Schools.

A professor of business administration at IU since 1991, Dr. Wimbush is former chair of various units in the Indiana University Kelley School of Business.
Dr. Wimbush has received multiple awards for his teaching of management and leadership. He was a Fulbright Scholar at the Economics Institute and International Business School—Zagreb, Croatia. In 2008, Virginia Tech's R.B. Pamplin College of Business honored him with the distinction of being a Wachovia Distinguished Speaker, and during the same year,

Howard University's Edward A. Bouchet Society inducted him as an honorary member. As an acknowledged national authority, he has published numerous articles and book chapters related to ethics in employment settings.

Dr. Wimbush earned a PhD degree in management and a master's degree in human resources management and industrial and labor relations from Virginia Polytechnic Institute and State University (Virginia Tech) in Blacksburg, Virginia.

Professor Wu Daguang

Professor Wu Daguang is the Vice President of Xiamen University. After graduating from the Research Institute of Higher Education Science (Now Institute of Education), Xiamen University with a PhD degree, he further pursued his studies at the University of Hong Kong and the University of Liverpool in Britain as a visiting scholar, and later at the University of California–Berkeley as a Fulbright scholar.

Professor Wu is a professor of higher education and has long been actively engaged in teaching and research in Western Higher Education, the Management of Higher Education and Comparative Higher Education. He holds a number of academic posts, including: Member of Academic committee of Xiamen University, Member of Social Science Committee of National Education Ministry, and Member of Academic Board of National Higher Education Committee.

In addition to his academic works, Professor Wu has long been involved in the administration and social activities of Xiamen University. In 2007, he was appointed Vice President of Xiamen University.

Professor Yang Desen

Professor Yang Desen, male, born in April of 1957, PhD, is Vice President and Dean of Graduate School of Harbin Engineering University. His main academic interest is acoustic engineering, and he is Deputy Director-general of The Acoustical Society of China. Prof. Yang has devoted himself to graduate education and education management for over 20 years. He acts as a convenor of Naval Architecture and Ocean Engineering Discipline Assessment Groups of the Academic Degree Commission of the State Council, and is Deputy Chairman of Heilongjiang Provincial Higher Education Society.