Higher education in the digital era

A thinking exercise in Flanders

Should higher education institutions embrace the digital revolution as the key to a new future? Should they resist it as a threat to their very essence, or just ignore it as just another dot com bubble? Did Flemish universities and colleges miss the train already?

The latter certainly not (yet). Flemish institutions are intensively engaged in e-learning: by scientific research, through a wide range of pilot projects (up to the organization of their own MOOCs, the famous Massive Open Online Courses) and by thorough discussion and reflection.

The above was one of the conclusions made by the two 'thinkers in residence' who were invited in 2014 by the KVAB to explore the state of the art in Flemish Higher Education and to confront it with their own vision and experience. Both Thinkers are international top experts in the advanced use of ICT in education.

Diana Laurillard (University College London, London Knowledge Lab) is professor of Learning with Digital Technologies and has a considerable experience in research and implementation of new ICT-based technologies in education. She has developed systematic methods and software tools (*learning designers*) for the production of new electronic learning materials and their optimal use in real life conditions.

Pierre Dillenbourg is professor at the Ecole Polytechnique Fédérale de Lausanne (EPFL), School of Computer & Communication Sciences, and has built an extended expertise in MOOCs, Computer-supported collaborative learning and work, Learning Technologies, and Human-Computer Interaction. He coordinates the development and support of MOOCs at EPFL.

For a year the Thinkers collaborated closely with a local experts group involving representatives from the higher education institutions, the relevant official bodies (ministry of education, accreditation body NVAO, educational council VLOR, interuniversity council VLIR) as well as the coordinating student organization VVS. They participated in various seminars and workshops at the five Flemish Universities and the UCL (Université Catholique de Louvain).

Each of the Thinkers has cast his/her conclusions and recommendations into a final position paper, contained in this report. Diana Laurillard lucidly develops her 'thinking about blended learning' in Flanders: blended learning requires thoughtful 'learning design' in order to improve the learning of the student as well as the cost effectiveness of higher education. Pierre Dillenbourg firmly proposes 'a digital strategy for Flanders universities' in order to strengthen and broaden their societal function by the optimal integration of digital technology. The full texts of both papers are published in this report.

After the KVAB closing symposium of November 19th, 2014, Diana Laurillard and Pierre Dillenbourg presented keynote lectures to the 13th Ethical Forum of the University Foundation "Will universities survive the e-learning revolution"? A selective synthesis of this forum by **Philippe Van Parijs** (UCL) is added as an epilogue to the Thinkers' position papers.

In the spring of 2015, members of the local experts group reflected thoroughly on the Thinkers' ideas, and elaborated them further into the group's own conclusions and recommendations for the Flemish scene. The report of the reflection group is published as KVAB-Standpunt 34: Hoger onderwijs voor de digitale eeuw (Higher education for the digital century).

Vlaamse overheid

RICHTING MORGEN
MET WETENSCHAP, TECHNOLOGIE, CREATIVITEIT & INNOVATIE
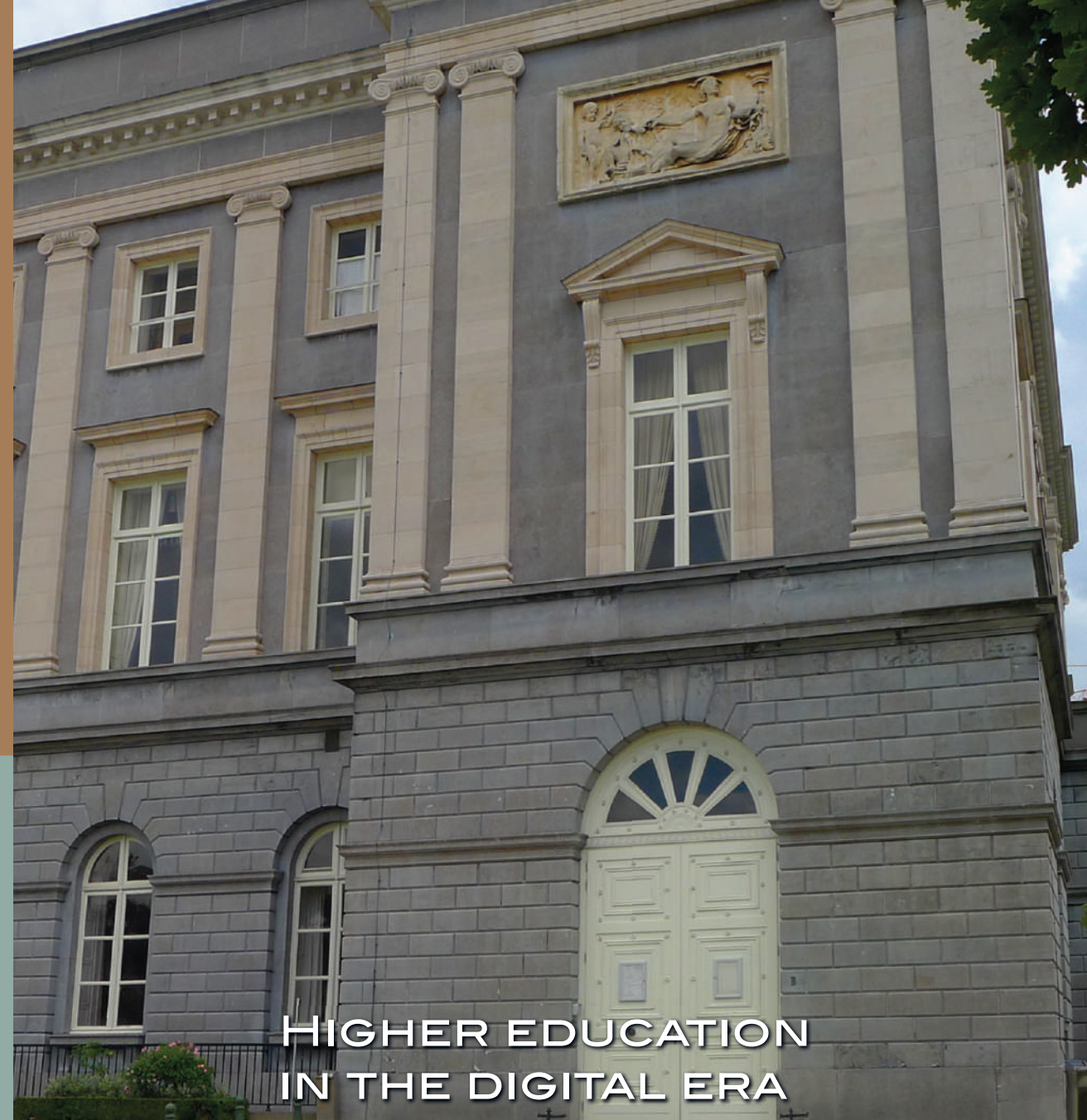
Higher education in the digital era

A thinking exercise in Flanders

Georges Van der Perre
Jan Van Campenhout (eds.)

Higher education in the digital era. A thinking exercise in Flanders

KVAB Press

Editions
Of
the Royal
Flemish Academy
of Belgium
for Sciences
and Arts

Standpunten nr. 33

Higher education in the digital era.
A thinking exercise in Flanders

KVAB Thinkers in residence program 2015

Georges Van der Perre
Jan Van Campenhout (eds.)

Standpunten – Koninklijke Vlaamse Academie van België

Higher education
in the digital area.
A thinking exercise in Flanders

KVAB Thinkers in residence program 2015

Georges Van der Perre
Jan Van Campenhout (eds.)

Table of Contents

Introduction

Georges Van der Perre and Jan Van Campenhout
Royal Flemish Academy for Science and the Arts of Belgium, Class of Technical Sciences

On November 19th 2014, the Royal Flemish Academy of Belgium for Science and the Arts (KVAB) organised a well-attended symposium entitled "*21st Century Learning in Higher Education: The Campus Blended Online? The Flanders Case*". The symposium was the highlight of the Thinker-In-Residence project "Blended Learning". This project had been initiated in January 2014 as a sequel to the KVAB Position Paper 19 (2013) that ended with the following conclusion: "*there is a need for a systemic vision on the optimal exploitation of ICT and the internet for the Higher Education of the 21st century*". That statement was the challenge and trigger to start the 2014 Thinker-in-Residence project.

Two independent 'Thinkers' from abroad were invited to explore the state of the art in Flemish Higher Education, to confront it with their own views and experiences, and to formulate their recommendations based on this confrontation. Both Thinkers are international top experts in the advanced use of ICT in education.

Diana Laurillard (University College London, London Knowledge Lab) is professor of Learning with Digital Technologies and has a considerable experience in research and implementation of new ICT-based technologies in education. She has developed systematic methods and software tools (learning designers) for the production of new electronic learning materials and their optimal use in real life conditions.

Pierre Dillenbourg is professor at the Ecole Polytechnique Fédérale de Lausanne (EPFL), School of Computer & Communication Sciences, and has built an extended expertise in MOOCs (Massive Open Online Courses), computer-supported collaborative learning and work, learning technologies, and human-computer interaction. He is deeply involved in the development and support of MOOCs at EPFL.

For a year the Thinkers collaborated closely with a local experts group (Table 1) and participated in various seminars and workshops at the five Flemish Universities and the UCL (Université Catholique de Louvain). At the symposium of November 19th 2014 they presented the results of their study and confronted these with the viewpoints of representative Flemish organizations (NVAO, VLIR, VLOR, VVS) and the experiences of providers and users of online courses.

After the symposium each of the Thinkers has cast his/her conclusions and recommendations into a final position paper. In her paper Diana Laurillard develops lucidly her 'thinking about blended learning' in Flanders. "Thinking" might be taken as her key message: blended learning requires thoughtful 'learning design' in order to improve the learning of the student as well as the cost effectiveness of higher education. Pierre Dillenbourg proposes 'a digital strategy for Flanders universities'. Here again the key message is in the title: higher education institutions

need a clear strategy for the strengthening and broadening of their societal function by the optimal integration of digital technology. The full texts of both papers are published in this report.

The day after the KVAB symposium, Diana Laurillard and Pierre Dillenbourg presented keynote lectures to the 13rd Ethical Forum of the University Foundation, which was organized under the theme "Will universities survive the e-learning revolution"? A selective synthesis of this forum was presented and written by Philippe Van Parijs, a widely known professor of economic and social ethics at the Université Catholique de Louvain (UCL). His text is added as an epilogue to the position papers.

In the spring of 2015, members of the local experts group reflected thoroughly on the Thinkers' ideas and position papers, and elaborated them further into the group's own conclusions and recommendations for the Flemish scene. The report of the reflection group is published as KVAB-Standpunt 34: 'Hoger onderwijs voor de digitale eeuw" (KVAB position paper 34: "Higher education for the digital century"). The latter paper is certainly not a mere summarizing translation of the Thinkers' position papers, it is an independent reflection from the point of view of the Flemish community, although it is fully inspired by the Thinkers' input and in line with their ideas.

On behalf of the expert group and the KVAB we want to congratulate Diana Laurillard and Pierre Dillenbourg for the great job they did as Thinkers-in-Residence on Blended Learning, and thank them for the fruitful and pleasant collaboration. We are convinced that their input will have a significant positive impact on the development of blended learning and the optimal use of digital technology in Flemish higher education.

Georges Van der Perre, Project coordinator
Jan Van Campenhout, Co-editor

A summarizing Dutch translation of the position papers can be found in the following reference: Georges Van der Perre, Jan Van Campenhout, Pierre Dillenbourg, Diana Laurillard. "Geef studenten toegang tot een nieuwe wereld. Blended learning en MOOC's: een denkoefening in Vlaanderen." TH&MA-Tijdschrift voor Hoger Onderwijs en Management (Instondo B.V.) 22, nr. 1 (January 2015): 29-37.

Table 1: Composition of the local experts group

Participation in the experts group does not imply as such the full agreement with the viewpoints expressed in this document.

KVAB members (from academia and industry):

Georges Van der Perre (chairman, KTW), Jacques Willems (KTW), Joos Vandewalle (KTW), Jan Van Campenhout (co chairman, KTW), Guido Beazar (KTW), Ludo Gelders (KTW), Willy Van Overschée (KTW), Kries Versluys (KMW), Lieven Verschaffel (KMW), Géry van Outryve d'Ydewalle (KMW), Irina Veretennicoff (KNW), Hendrik Van Landeghem (KTW)

External experts in blended learning:

Erik Duval, Piet Henderikx, Anne-Marie De Jonghe, Luc Vandeput, Erik De Corte, Hans Van Mingroot

Participants delegated by:

- **The five Flemish universities: UAntwerpen, UHasselt, UGent, VUB, KU Leuven**
  Anneleen Cosemans, Greet Debeer, Gwendoline Somers, Jan Velghe, Karla Groen, Sabine De Vriendt, Saskia Van Bueren, Stephanie Verbeken, Toon Van Hoecke, Yana Maes, Lieselot Declercq

- **The Flemish interuniversity council (VLIR)**
  Jo Breda

- **The Flemish Education Council (VLOR) - Working group digital learning:**
  Cis Van den Bogaert

- **Flemish institutions for ICT R&D and training: IMEC and iMinds**
  Rudy Lauwereins, Frank Gielen

- **The two school networks (Community Education GO! and Catholic Education NSVKO)**
  Jens Vermeersch, Greet Vanderbiesen

- **The Flemish Ministry of Education**
  Noël Vercruysse

- **The Dutch-Flemish Accreditation Body (NVAO)**
  Fred Mulder

- **The Enterprises-Employers organisation Agoria**
  Stephane Wojcik

- **The Young Academy of Belgium (Flanders)**
  Karolien Poels

- **The Flemish coordinating student body VVS**
  Andreas Frans

- **The Université Catholique de Louvain (UCL)**
  Michel Gevers, Françoise Docq

Thinking about blended learning
A paper for the Thinkers in Residence programme

Diana Laurillard

Professor of Learning with Digital Technology, London Knowledge Lab
UCL Institute of Education

Contents

1. Introduction

The aim of the project as defined by the KVAB is: *the development of a systemic vision on the optimal exploitation of ICT and the Internet for the new learning of the 21ˢᵗ century.*

We were asked to produce a broad long-term vision paper on blended learning, including hypotheses, possible models and future scenarios, on three levels: micro (learner, teacher, class), meso (institution, school) and macro (the policy makers, e.g. the educational networks and the governments).

The thinking articulated in this document is the result of the many conversations with my co-thinker, Pierre Dillenbourg, the members of the KVAB Expert Group, and the staff of the universities we visited over the past year. It has been a great opportunity to think, rethink, and then think again – and I hope we will all continue to do that, because our changing technology environment demands us to do so.

A simple definition of 'blended learning' is "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004). It blends the campus-based with the online. It must be 'thoughtful' because technology is complex and continually changing. It must be a thoughtful 'integration' because the digital is not a supplement, and does not simply replicate aspects of the conventional – each should enhance the other.

Blended learning means respecting the true value of conventional methods – such as seminars, tutorials, projects, labs, field trips, physical materials. And it means acknowledging the extraordinary power and flexibility of digital technologies. How can the two be thoughtfully integrated to give education the power and flexibility it needs in order to play its proper role in 21ˢᵗ century life?

So my slightly modified definition of blended learning is: *the thoughtful integration of conventional and digital methods of teaching and learning as the means to achieve our greatest ambitions for 21ˢᵗ century education.*

2. Why is it important to think about 'blended learning'?

The integration of digital technologies with conventional methods of teaching and learning is already a feature of higher education (HE). Integration is increasing rapidly, primarily because of the ubiquitous presence of digital technology and the increase in the digital skills of both students and teachers.

Digital technologies are bringing powerful changes to education systems, none of which are under the control of the academy. The increases in access to devices and communications, in students' digital literacy, in private providers' development of learning environments, and in free online resources, change the ways in which students access and learn concepts and skills. These are powerful forces and they will change education with or without the involvement of academics. Better that the academy engage and lead than avoid and perish.

So we have to think about blended learning.

What is there to look forward to if universities were to embrace the practice, and succeed in optimising it? If we can imagine a better future HE system, how different would it be?

We could be setting a challenge for digital technology to meet. It is powerful, after all, it attracts massive investment, it evolves fast, and it generates major changes. If the academy takes the trouble to engage with digital technology, we are entitled to dream.

What are our greatest ambitions for the future of universities? University mission statements everywhere include high ambitions, as do those in Flanders:

> **KU Leuven's** vision of teaching and learning emphasizes the close link between research and education: study programmes are research-based, thus enabling students to acquire academic competences, ... Moreover, students integrate these academic competences within a broad ethical, cultural, and social formation… This enables them to assume their social responsibility as committed citizens.
>
> **Hasselt University** aims to widen participation, addressing all talents, and inspires its students and staff to develop their full potential in a dynamic environment.
>
> **The University of Gent** wants a creative community of staff, students, and alumni connected by our common values commitment, openness and pluralism… to contribute to society from a unique scientific expertise.
>
> **The Vrije Universiteit Brussel** offers high-quality education and research… research teams are internationally recognized in many disciplines of fundamental and applied research. … Thanks to this expertise and its strategic location, the Vrije Universiteit Brussel is an ideal partner for prestigious research and education with an outlook on Europe and the world.
>
> **The University of Antwerp** is an academic community of students, lecturers and researchers in who help each other acquire new scientific insights and develop skills… and enhance their own learning and so are able to contribute to the well-being of our society.

They all position the university as working at the highest level of intellectual achievement, and contributing to their social environment. And as we discovered when we visited the five Flemish universities and the neighbouring Belgian university UC Louvain, all of them already use learning technologies in their teaching, and have central units with the expertise and willingness to support their academic teaching in this kind of innovation. But the impact could be so much greater. That is what we have been thinking about.

Digital technology works on the large scale and handles it well, so if we want to challenge what it can really do for university education, we should begin with those high ambitions, and take them to the large scale.

As we talked with and listened to the experts, academics, students, and senior managers we met, there were many immediate local problems needing solutions. But as we consider the near-term changes we could make to improve the quality and scope of HE we should dream as well. In the end we should be able to articulate what we really want for the future of universities, and harness the technology to help us achieve it.

3. A systemic analysis of innovation in HE

Higher education is a complex system of national, local and institutional stakeholders, public and private institutions and forces, and a broad range of professionals. It takes responsibility for conducting every student through the formal education that should enable them to attain their learning potential, for the benefit of both individuals and society. The complexity of this system means that developing and embedding any radical change requires a clear understanding of how it operates, because its complexity makes it highly resistant to change.

To gain some traction on this complexity, it is useful to think in terms of how the professionals in the field prioritise their work and practice, because the comparative strength of all the competing influences determines the success of any one initiative for change and innovation. Figure 1 shows this in terms of the principal 'drivers', i.e. the elements of the HE system that determine how the academic teachers and leaders are likely to prioritise activities. Unfortunately, innovations in blended learning are not demanded by most of the drivers. These are, roughly in order of decreasing power (though not necessarily importance):

- funding imperatives,
- assessment requirements,
- stakeholder demands,
- quality assurance,
- strategic plans,
- curriculum requirements,
- students' individual needs and skills,
- teachers' career opportunities (Laurillard, 2013).

If, for example, there were a funding imperative to be innovative in teaching, then this would become a priority for academics.

The drivers in a system define the influences a professional cannot ignore, so they will act to prioritise activities that respond to them. But they are not sufficient for effective action without the 'enablers', i.e. the mechanisms the professional cannot do without if they are to respond effectively to the drivers.
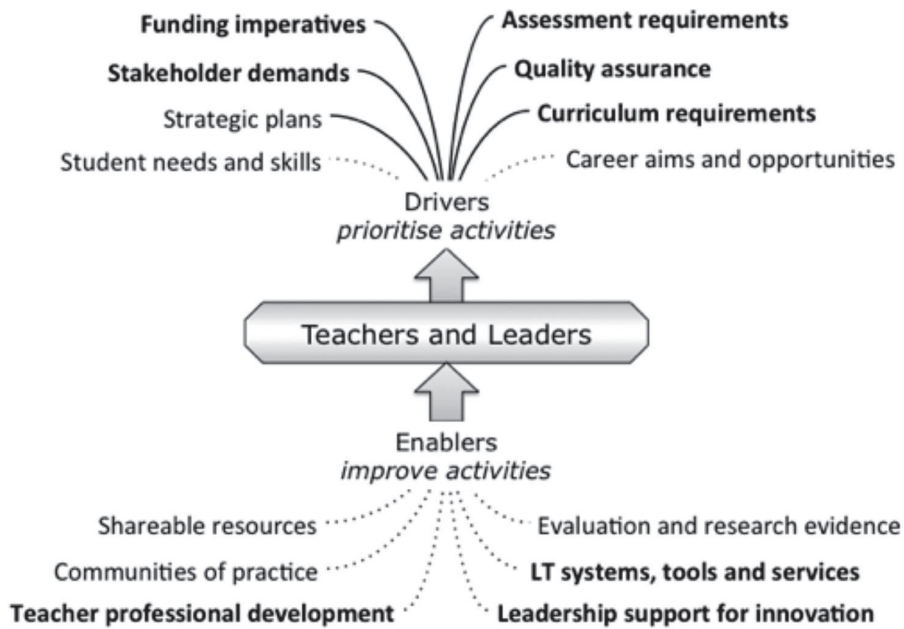
Fig. 1. the drivers of professional activity in the HE system balanced against the enablers for innovation in learning technology (bold indicates the more powerful ones).

If we consider the balance between drivers and enablers for the case of innovation in learning technology, the relevant enablers are those that best support teachers and leaders in the change process. These are, in order of decreasing effectiveness:

- leadership support for innovation,
- teacher professional development,
- learning technology tools, systems and services,
- communities of practice,
- shareable resources,
- evaluation and research evidence.

The question is: are the drivers sufficient to prioritise innovation in learning technology, and the enablers in place to support it?

The same analysis can be applied to all sectors of education, including schools, vocational education and lifelong learning. The drivers and enablers are the same, although the agencies and their comparative influence are different.

Drivers of change

The responsibility for the drivers in the HE system in any country is usually distributed across independent agencies and institutions, none of them wholly under the control of the universities. This makes it difficult to develop a unified system-wide strategy of change to make the best of learning technology. Few of these critical drivers are being adjusted to accommodate the idea that the system needs to make optimal use of learning technology.

These are the questions that could be asked at any level, from institutional department head to Minister, and in any sector, primary through to adult learning:

- **Funding imperatives –** There is often a drive for lower unit costs, but do funding imperatives use viable costing and investment models for online teaching and scaling up?
- **Assessment requirements –** Do the types of summative assessment of students, and the attainment levels they define for knowledge and skills, take account of the potential of technology-based assessment?[1]
- **Stakeholder demands –** Employers, citizens, students, policymakers, and governments are likely to demand changes that recognise the digital world, but do they expect these to happen without investment in change?
- **Quality assurance –** Could university performance funding relate to the quality of teaching, or degree of teaching innovation, as well as to research?
- **Strategic plans –** Do the government and institutional aims and objectives that are used to prioritise professional activity specify clear targets and investment in teaching innovation?
- **Curriculum requirements –** Are the digital skills required for graduates, given the changing environment and stakeholder demands, being updated across all degree programmes? Are the 21st century skills being embedded across all curriculum areas?
- **Students' needs and skills –** Are institutions responding to the diversity of students by using assistive technology for special needs, and online technology for flexible access? Are they using students' considerable digital skills to help them develop the skills of digital learning?
- **Career aims and opportunities –** Are the standards expected and rewards offered for teaching excellence dependent on effective use of learning technology? Do they reward the personal motivation of the academics who wish to redesign and improve their teaching?

None of the principal drivers of action in HE demand that academics prioritise teaching innovation. There is certainly no consistent driver for innovation in effective blended learning,

----

1 Apart from multiple choice questions forms of assessment, which are widely used.

and no expectation that academic teachers and leaders should keep abreast of new opportunities with each new technological innovation.

Here is a powerful way for the HE Minister to promote change, therefore: *to require each agency responsible for these drivers to report on how it would change its approach to ensure that academics prioritise innovation in blended learning.*

Enablers of change

The most relevant enablers identified as being critical for successful innovation are common to all sectors of education, and applicable also to HE. Academic teachers report on the need for all these to be strengthened, as a recent UK survey showed[2]. Again, these questions could be asked at every level and in every sector of education:

- **Leadership support for innovation –** do leaders provide the vision, strategy and resources to give academic teachers the time and encouragement to innovate?
- **Teacher professional development –** is there continuing professional development to update skills and knowledge of learning technology?
- **Communities of practice –** is there support for teachers to exchange teaching ideas and practices, ways of using new technology, and opportunities for peer evaluation and review of innovative practice?
- **Learning technology systems, tools, and services –** is there sustainable provision for open, education-oriented learning technology infrastructure, tools and resources, with good technical support?
- **Evaluation and research evidence –** is there funding for studies to provide evidence, design principles and results to inform practice?
- **Shareable resources –** is there access to open education resources and learning design tools, to reduce the costs of innovation, and to enable teachers to build on each other's work?

The learning technology innovation that has taken place to date in HE has been done by individual academic teachers and leaders, rather than through a coherent national or institutional strategy. These education professionals had the vision, and gave the time to innovate, develop, test and share what they have done. However, the successful innovations remain patchy and localised, not systemic and sustainable.

All these enabling mechanisms remain starved of funding, and with little or no strategic priority for developing and sustaining them. They will continue, and given the absence of any clear drivers for blended learning innovation they will remain its main source in the future, but being so localised, they cannot be a force for system change.

---

2   https://www.alt.ac.uk/sites/alt.ac.uk/files/public/ALTsurvey%20for%20ETAG%202014.pdf

What would make a difference?

This systemic analysis suggests two systemic actions:

- Update the principal drivers in the education system to harness digital technology and so drive the development of new practices.
- Develop the enablers to make the new practices effective.

The alternative is that the system will continue to rely on piecemeal local innovations in teaching and learning that have no large systemic effect. At institutional level and at national level, education leaders must consider their own responsibility for innovation.

Updating educational drivers and enablers to keep pace with the digital world could be sustainable and progressive over the long term, and would make innovation affordable as a natural part of how institutions operate.

4. Teaching and learning

How will blended learning change learning?

Blended learning does not really change what it takes to learn. Formal education requires students to learn concepts and skills that they will not be able to learn for themselves. There are ways of thinking and practicing that very intelligent people have spent hundreds of years developing, and they are not easily learned. That is the point, and the value of education.

There are several theories of what it takes to learn, including instructivism, constructivism, guided discovery learning, problem-based learning, collaborative learning, and others. In combination the types of learning activity they emphasise can be synthesised as learning through (Laurillard, 2012):

- **Acquisition:** reading, watching, listening
- **Inquiry**: using resources to develop an evidence-based output
- **Discussion**: debating, questioning, answering, negotiating ideas
- **Practice**: acting, in the light of feedback, to achieve a goal or output
- **Collaboration**: working with others to achieve a joint output
- **Production**: making something for others to evaluate against agreed criteria

Both conventional and digital technologies enhance and support all these types of teaching and learning, while formative and summative assessment require some form of production from the student or group.

Blended learning combines conventional and digital methods to achieve an "optimal exploitation of ICT and internet" integrated with the conventional technologies of physical material, and co-presence in space and time.

The value of blending the two is that digital methods offer much greater personalization, flexibility, inclusiveness and efficiency than conventional methods can, but they have to be used appropriately, for example:

- **Personalisation**: A digital environment can use individual performance to adapt the level of content, or difficulty of activity to the individual's needs, though at present this is remarkably rare in educational software. It can also adapt to individual preferences, but the value of education is to *extend* rather than satisfy an individual's preferences, so the personalisation of the commercial world is inappropriate for education. Adapting to learning needs has far more educational value.
- **Flexibility**: Online provision allows access to study at any time from any place, but scheduled deadlines are also important to avoid student procrastination. Flexibility in the curriculum is easier to provide online because students can co-produce the knowledge by interpreting theory in terms of their own localised case studies, not just those provided by the academics.
- **Inclusivity**: Assistive technologies, such as those for learning disabilities, emotional problems, physical disabilities, and language needs, open up access to education to even more people. We must be aware of, and ameliorate, the *digital divide*, but equally must recognise the *digital bridge* that extends opportunities to millions of students who would otherwise have no access at all.
- **Efficiency**: Technology reduces the cost of delivery and communication if it works with large numbers to achieve economies of scale. It reduces the cost to the student of attending campus-based courses, depending on their access to technology. Recording and analysing student data increases a teacher's ability to monitor and respond to students' needs. Teachers can collaborate and build on each other's designs and resources to reduce their own development time.

If we made full use of these properties of digital methods, blended learning would enable more learners to achieve a higher level of attainment than is possible with conventional methods. All education sectors can point to local successes, but if blended learning is to realise its full potential to improve learning, we need much more leadership, planning and investment than we have seen so far – in any country.

Blended learning and the teacher

Teachers who move to online teaching will be aware of a significant increase in their workload, if they are setting out to make optimal use of the technology. It involves several new kinds of teaching activity:

- Planning for how students will learn in the mix of the physical, digital and social learning spaces designed for them
- Curating and adapting existing digital content resources for learning through acquisition (reading, listening, watching)
- Selecting the online tools and resources for all types of active learning (inquiry, discussion, practice, collaboration, production)

- Designing and developing the independent learning activities for all these types of learning
- Developing the personalised and adaptive teaching that improves on conventional methods
- Scheduling for flexibility in blended learning options
- Managing the tutor role in online discussion groups
- Using technology to improve the efficiency of qualitative feedback
- Designing the means to guide and nurture large cohorts of students
- Designing, monitoring, interpreting and using the new and more sophisticated learning analytics, which can give the teacher a clearer representation of where the teaching needs to improve.

These are the high-level complex skills that make teaching a form of 'design science'. They are not well researched or understood because the teaching community is still discovering how to do them. There are several resource repositories but very few tools to support teaching design, and teachers in all sectors are given no time to develop these skills. A professional design scientist – one who builds on the work of others, designs, tests, redesigns, and shares the results – helps to build the practical knowledge of their field (Laurillard, 2012). As a professional community teachers could be building our practical knowledge of how to optimise teaching with technology.

However, building the knowledge of how to optimise teaching with technology takes time, and this time will not be given from research time. We therefore need a redistribution of how academics spend their teaching time, to allow for this new requirement. We must make time for the development of professional teaching knowledge.

For the teaching community to become proficient in the effective use of learning technology we need to rethink what it means to be a professional teacher. Some are full-time teachers, some spend only a fraction of their time teaching, but everyone who teaches will need to agree on a shift to greater professional responsibility for evidence-based and collaborative innovation in the use of digital technologies. What might that mean in terms of workload distribution?

A better understanding of how teachers might spend their time to best effect would lead to a rebalancing of proportions of time spent, such as the example in Table 1.

Table 1: A potential shift in the distribution of teaching activities

Reducing	Increasing
Original design and preparation of all learning activities and resources	Collaboration on evidence-based development Specialist original innovative design Generalist re-design of activities and resources
Presentation	Tutor-based individual guidance Tutor-based group guidance
Summative assessment	Peer-based formative assessment Automated formative assessment
Administration	Professional development Teaching evaluation with learning analytics

If we assume that the total amount of time spent on teaching remains the same (a significant assumption, that could be challenged), then we could explore different ways of distributing the total teaching time for the conventional and blended models.

In Figure 2 the horizontal axis represents the range of teaching activities that could be done by any teacher, and the vertical axis is the percentage of time spent on each. The blended learning data represents a possible redistribution of the conventional teaching time, according to the following principles for optimising the use of technology:

- Preparation as original design is in the academic's specialist area and explores innovative use of technology, rather than covering all their teaching.
- Most preparation involves more adoption, re-use, re-design and collaboration, using materials developed by peers, and accessed from online repositories, design tools, and teaching communities.
- More professional development allows teachers to update on learning technologies and the use of learning analytics, and to share findings and new knowledge.
- There is less time spent on class presentation, as this will shift to more online presentations, and inquiry activities.
- There is less time spent on summative marking and more time spent on formative guidance.
- There is less administration because this is done more efficiently through the better deployment of IT systems.
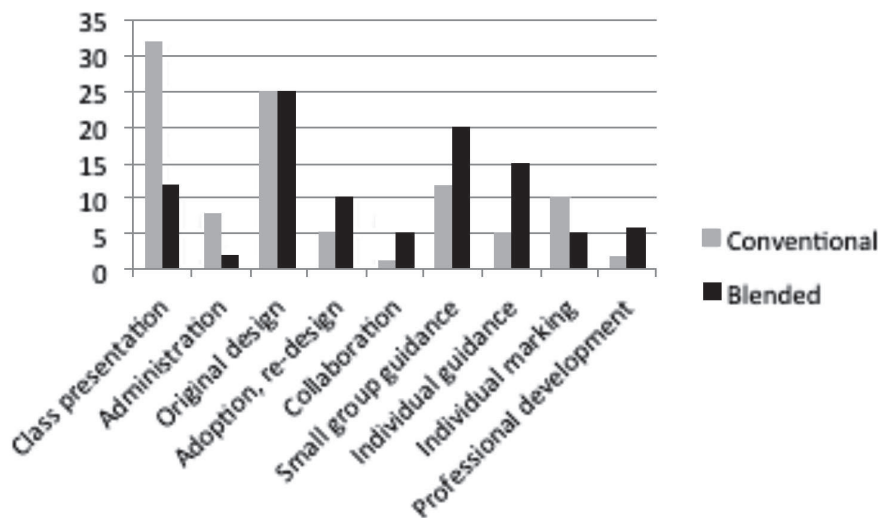

Fig. 2. A possible redistribution of teacher time to provide more for innovation in learning technology and student support

Less time for marking presupposes that we achieve better methods of automating summative assessment. More time on individual guidance could be supplemented further for students if they had the benefits of computer-based formative assessment and peer assessment (see next section).

Reducing administration is probably the greatest challenge here, because it has increased so much in recent years as the proportion of administrators in universities has risen and generates far more administrative work for academics to do. Universities invest in IT systems with the promise to reduce administrative costs, but this typically shifts a great deal of the work to academics. There is no reason why the move to blended learning should reduce this. Instead, we should phrase it as a strategic management goal: for university leaders to achieve a substantial shift in academic teaching time from administration to the core activities involved in teaching itself.

This redistribution also proposes that the academic does their original teaching design in their specialist area, taking the time needed to produce a high quality and durable technology-based learning resource that is very well designed and tested, and can be adopted and reused by others. The time for 'original design' could be similar, but more focused than in conventional mode.

The rest of their teaching will shift to more adaptation of others' resources. It should become easier for academics to adopt and re-design existing resources, such as open education resources (OERs), using online design tools and environments, and design templates. It is important for academic teachers that they should be able to adapt whatever resources they adopt.

The patterns of distribution may be different for each department. Certainly, within the average distribution for a department there will be different patterns of teaching time distribution across its staff.

This approach would make use of the enablers of *using shareable resources*, *joining communities of practice*, and *doing professional development* (see Figure 1). It would also allow more *evaluation and research* data to be collected and shared. But it does not address the driver of *career opportunity*. Teachers also need recognition and reward for their evidence-based innovative and effective learning designs, honed through evaluation until they are good enough to be adopted by others. They also need to be incentivised to adopt the innovations of others. Recruitment, selection, appraisal, quality assurance and promotion practices rarely act as incentives to be an innovative and effective teacher. The culture of the teaching community in all sectors is to care more about students than about management targets, but the latter always win, because they affect careers far more than students do.

One of the student voices in our Symposium on Blended Learning said: "Stop trying to be progressive … we want you to make us progressive". It is an arresting thought. Should we stop wasting time on trying to turn the promise of technology into a reality? Should we return to books and dialogues with our students, guiding them to make their own progress? Why did I turn away from lectures all those years ago, and seize on the fledgling digital technologies as the promise of progress? Well it was because it was so clearly such a waste of time for those students, 70-100 of them at a time, from many different countries and qualification systems, each struggling with a

different perspective on my single description of a mathematical concept. How could such a system possibly enable me to help them think for themselves? After discovering the utter pointlessness of the mass lecture, for maths at least, I tried many other ways of teaching them, not always successfully, but at least some worked surprisingly well. This is what teachers do. Teaching really is a design-test-redesign process, and we should encourage that, and then the sharing of those small local discoveries. Digital technologies are just a wonderful addition to the possibilities that one might try.

No, we cannot stop trying to be progressive. If every student is to achieve their learning potential, then we must keep pushing the digital technologies to make teaching more personalised, flexible, inclusive and efficient. But certainly, our students should be able to see the results by now.

Teachers would benefit from membership of a collaborative professional community that develops and builds the evidence-based understanding of teaching with digital technologies. As researchers we have this. As teachers it does not exist, so we do not progress our knowledge and understanding of teaching.

Assessment, exams, and evaluation

It would of great benefit to both students and teachers if technology could increase the amount and value of formative assessment. Students need it and want it, but for teachers it is time-consuming and laborious, especially as double marking is important for quality and reliability.

Digital technologies contribute to all three challenges of assessment, exams, and evaluation, in ways that could result in some radical changes for universities:

For formative assessment (giving feedback to help the student improve their work), they offer automated feedback and grading, and support peer assessment and grading.

For summative assessment (giving a grade of the quality of the work, sometimes with feedback), they support peer grading and computer grading.

For course evaluation they offer learning analytics, which track student performance in a way that provides feedback to the teacher on the quality of their teaching and course design.

Automated feedback and grading

Digital technologies have led to widespread use of programs that do automatic marking of quizzes of different types, especially multiple-choice questions (MCQs). They are used for both formative and summative assessment. These techniques greatly reduce the variable (per student) costs of marking. However, automated marking necessarily neglects the concepts and skills that are hard to measure this way.

Computer-based assessment has far more potential value than we have explored so far. For subjects where MCQs are appropriate their value could easily be improved by suppressing the possible answers to the question until the student has submitted their own answer, i.e. 'concealed'

MCQs, or CMCQs (Laurillard, 2002). When the options are revealed the student has at least done their own thinking, and can improve on their answer. And the software has collected the range of possible student answers, which can be analysed to create algorithms for potentially recognising student answers.

For subjects that concern human and physical systems that can be modelled by a teaching program, the student can be invited to manipulate the parameters to achieve a specific output – requiring a deep understanding of the relationships and behaviour of the system, but one that can be directly assessed by the model itself. The value of such systems is that they are ideal learning environments as well. Automated testing of the operation of computer models is reliable enough to use for summative assessment, where it is a viable solution.

Experiments with automated essay marking have shown that a comparative linguistic analysis of the student essay and selected readings can direct the student to issues they have not covered, or inaccuracies in their wording. This can be of real value as formative feedback on a draft essay, although not yet viable for summative assessment.

Investing in research and development of automated summative assessment methods is now essential.

Peer assessment and grading

MOOCs have led to an increase in work on peer assessment, due to the assessment workload created by large cohorts, and the dissatisfaction with automated assessment. Students are given a rubric to guide the production of their own assignment, as in conventional assessment, but here they use the same rubric to evaluate their peers' assignments to give them a grade and feedback. There are several ways of attempting to quality assure this process:

- Students go through a training phase of grading assignments until their grades match those given by the tutor.
- Academics carry out spot-checking of peer grading.
- Several students grade each assignment.
- Grading by comparative ranking of several assignments.

There is considerable pedagogic value in peer assessment because students learn a lot about their own work by assessing others'. So we can make the valid argument that it has high value. It is harder to convince them that it is fair. Certainly peers cannot offer the same quality of feedback as a tutor. A recent evaluation report for a MOOC showed that 'Doing a peer review' received 85% approval, whereas 'Receiving a peer review' received only 78% approval – still high enough to be of some value, although this was on a CPD course, where peers could be trusted to have some knowledge (Laurillard, 2014b).

The technology can support the process of peer assessment by ensuring that every assignment submitted is graded by N students, where 'N' is defined by the teacher. The system can also support the process of training a student to grade in the same way as a teacher. However, relying on good quality peer grading would not be acceptable for high stakes summative assessment.

Learning analytics

The amount and quality of data available to teachers and students using blended learning could greatly enhance course evaluation.

Students using digital systems, tools and resources leave traces of their actions – learning analytics data – that can be tracked and represented to teachers as information about student performance. Interpreting this information is not straightforward, but it does offer the potential for a much better understanding of the relation between what teachers provide and what students do. The number of posts to discussion forums can identify which topic holds the greatest interest for students, but to find out why takes further research. Scores on tests can identify which topics are the most problematic for students; finding out what teaching works better takes further research. Evaluation data from students' perceptions are therefore also essential for helping teachers improve the course. Then the new performance data may be important for identifying that improvements have been successful. In this way, the digital systems now in use for teaching and learning have the potential to bring much more rigorous evaluation methods to teaching and learning.

Students can also derive great value from learning analytics, because the comparison between their own behaviour and that of their peers can tell them, for example, that: the social networking within their group is not as well connected as other groups; their current scores are not on a trajectory that typically ends in a distinction; their current engagement in discussion forums does not match the engagement of a good student, etc. Institutions that use learning management systems to track all student performance data can help students understand and work towards behaviour that is more likely to help them succeed.

When a student challenges their summative assessment score, the tracking data from their performance during the course can help to demonstrate why they achieved a low score.

These are the tools a professional teacher should have at their fingertips, along with the training and support to use them effectively.

5. The external role of the Institution

The senior leadership of an institution has the responsibility to create the conditions for it to be the kind of learning organisation that continually adapts to its changing environment to serve its stakeholders. Stakeholders external to the institution include schools, citizens, employers and government.

This section looks at how blended learning models could change the way HE works with schools, and in providing new forms of lifelong learning, professional development, and free public education 'pro bono', with alumni, and on the global stage. These are activities that universities currently engage in, but if the scale increases due to online access then we have to consider affordability and the degree to which the costing models of education change as we move to blended learning. And what does that mean for how institutions work with each other – do they compete or collaborate?

Interaction with schools

As we talked to universities in Flanders one repeated current issue was the transition from school to university. Students arrive unprepared for the level of work and the rigours of independent study. There is high bandwidth connectivity between schools and universities now, and the imagination of the teachers and students can be used to build the bridges that will improve student readiness.

One example is to redesign subsets of online courses and resources as 'taster' courses for school students, in any subject area, and especially those who are not taught at school. Universities will use these techniques to showcase their top lecturers and specialist courses, but could also cooperate to enhance applicants' capacity for high-level independent learning, which all universities need.

Other ideas involve school learners in the work of university students, e.g. as recipients of student project presentations to test their communication skills, or as assistants in collecting data for science projects.

Teacher professional development is devolving much more responsibility to schools, so the ideas and information can go both ways. One example of the co-production of knowledge in an online course is where academics supply the formal knowledge and trainee teachers supply the evidence and reality of the application of theory in practice. The same idea could be used with the many university students who could contribute their experience to the wider understanding of taking theory into practice.

Open and Distance Learning and Lifelong Learning

The new production of knowledge, foreseen by Michael Gibbons and colleagues in the 90s, recognises both the formal, codified knowledge of the traditional disciplines, and the informal, implicit knowledge created by communities of practice (Gibbons et al., 1994). Our online courses can now bridge the two. They provide access to the formal knowledge, but can also develop those communities of practice, where mature students, teachers, and working professionals share their experience of theory in practice, of taking the formal into the workplace and testing it there. Teaching in this context is nothing like the traditional idea of transmission or delivery, but is a theory-informed dialogue about practice that in turn co-produces a collective understanding. With open access to such courses, why should undergraduates not be engaged in those same communities?

Graduates and academics alike are aware of the rapid developments in the production of knowledge, fostered by the immediacy and universality of online communications. Lifelong learning is now essential for every employee and citizen, if they are to maintain their capacity to contribute. Open online courses will therefore increase in importance and value to every individual. Universities should be planning to respond to this increasing demand, whether it is their main focus, as for the open universities, or is a by-product of their campus-based undergraduate and post-graduate courses.

Universities could be creating more opportunities for lifelong learning with other institutions to foster innovation circles, entrepreneur start-up networks, and workplace learning opportunities for students and graduates.

A university's own alumni will be an obvious community who would benefit from access to updating courses for their professional development. In addition, they could be collaborators. There would be great mutual value in linking alumni to the current students in their field, as a source of workplace learning and ideas for projects. Open online courses would broaden into open online communities of mutual learning and development. The alumni network, as co-producer of knowledge and skills, would be a real and practical force for progress.

We could imagine different sections of a university engaging in, on the one hand, the production of broad knowledge and understanding through interaction between large groups of teachers, learners and professionals, and on the other hand, engaging some of those groups in specialized scientific research, concentrating on very narrow areas. Both belong to the essential tasks of the university.

MOOCs and socio economic education models

MOOCs have done the great service to blended learning of raising the profile of online learning, and what it can do for the quality, scale, and reach of higher education. The idea has also generated some exaggerated claims and unfortunate myths about the nature of education and online learning, for example:

- 'Content is free' – It is not; it always costs time, and education is not merely delivery of content; the content of courses must be carefully curated and the activities relating to it carefully orchestrated by the teacher.
- 'Students can support each other' – They can, but a course format that copes with large numbers by relying entirely on peer support and assessment is not an undergraduate education; education is not a mass customer industry, it is a personal client industry.

The claim that MOOCs provide a new socio-economic model for education ignores their reliance on delivering knowledge by video, quizzes, and forum chats, which is not sufficient support for undergraduate learners. They have developed no cheaper way of managing the labour intensive costs of a university's summative assessment, so they cannot yet accredit at HE level. They are estimated to cost around $50,000 for a 6-week course (although the range is very wide), but even with tens of thousands of registrations the current income per student is far too low (at around $50), given the take-up (~1% of registrants pay for the certificate), to ever meet that cost. Universities clutch at the straws of 'reputation', 'marketing', and 'it's really for the benefit of innovation for our undergraduates', as if this had not been possible before.

The marketing value is difficult to estimate because universities often do not know the profit margin for their individual courses. A $50,000 'marketing campaign' is very high cost. If this brought as many as 25 students to the related fee-paying course, and such cases are rare, the

course would have to be making a profit of $2,000 per student for the campaign to break even. If it were, it would not need a marketing campaign.

Nonetheless, the high numbers of students taking MOOCs attract the attention of senior teams, and suddenly it becomes possible to commit major investment for innovative online courses, even with no clear expectation of financial return. By these essentially irrational means, we are at last seeing innovation in learning technology that could eventually benefit the fee-paying undergraduates. First we have to learn from this experience, because the current delivery model of MOOCs is inadequate for undergraduate education, unless it used as just a component of a normal course.

The typical MOOC pedagogy matches very well what is typical for professional development courses, however. Professionals need to know the latest information, ideas and thinking, they derive great value from talking to each other, exchanging experiences and ideas, and they do not require anything other than a certificate of attendance. The great majority of MOOC participants (85%) are professionals with degrees, not aspiring undergraduates (Grainger, 2013).

The MOOC model therefore provides free education to highly qualified professionals. This is not, in itself, a progressive socio-economic model, and it has not allowed us to learn how to provide even low cost education for undergraduates.

However, if we were to set our sights high, for example: 'to prepare graduates to assume their social responsibilities', 'to widen participation', 'to contribute to society from a unique scientific expertise', 'to promote humanist values'… then it is possible to imagine ways in which MOOCs could use professional development courses to reach into the areas of the world with greatest need of education. Consider the case for teacher professional development (TPD):

- UNESCO estimates that 1.6m new teachers will be needed by 2015 to achieve universal primary education
- One recent TPD MOOC reached 4000 teachers from emerging economies
- Each of them could run a national course, using the MOOC resources, to train 50 students as teachers
- Each of those teachers could use the same resources to support village support groups to train 8 teaching assistants

That multiplies up to training 1.6m teachers. We have the technology. MOOCs have demonstrated that. And with the political will we could achieve that within a year or two.

A viable way forward would be to create a professional development MOOC for academics in all the Flemish universities, which orchestrates and supports their collaboration on developing a school-oriented 'HE preparation' MOOC, to assist in the transition to university study. The MOOC would model the optimal pedagogy so that the academics experience online learning as they participate on the course. The large-scale online courses they then go on to develop for undergraduates, professionals, employers and the wider public, could be incentivised in the same way as research collaboration. Competitive funding would promote the discovery of the pedagogic innovation and new models that will ultimately create the differentiation factor in comparison with other universities. In this way the universities build their understanding of how to run large-

scale online courses for undergraduates, in the same way as we typically build knowledge through research and experimentation.

How will blended learning change the costing models in education?

MOOCs are about the large scale, and they enable us now to imagine solving the largest problems education has, in an affordable way. Teachers do not typically think through the issues of the costs and benefits of teaching and learning. Conventional teaching works on the very small scale of one teacher to a few 10s of students, whatever the sector. Blended learning demands that we now think on the large scale, and we cannot simply repurpose the financial models of the pre-digital world. This section starts afresh.

The teaching costs of the full range of educational technologies vary greatly, according to the fixed and variable costs of different teaching methods (Laurillard, 2011):

- The *fixed* cost of design and preparation (of materials, resources, activities, tools, learning environments) is the same, no matter what the size of the student cohort.
- The *variable* cost of teaching and support (for tutoring, discussing, advising, counselling, guiding, formative feedback, marking) is the same for each student, and will increase with the size of the cohort.

Reducing the variable costs is our greatest challenge, because student support has to nurture and guide the capability of the individual according to their needs. The less well prepared they are, the more support they need. Open courses recruit students with greater needs than those that require a certain level of prior attainment.

Courses can be modelled and their viability estimated and compared by varying the cost-related parameters of: learning time, period of study, teaching-related income, teacher time costs, teaching design time, teaching support time given students' readiness, number of students, and students' prior attainment. The learning benefits can be modelled by defining the properties of each of the selected teaching, learning, and assessment activities in terms of the types of learning it supports, and the student group size.[3]

While conventional technologies support several course formats for different types and numbers of students, they are constrained by the limitations of physical resources, scheduled time and location. The greater flexibility of blended learning supports a much greater variety of course formats for different types of students, and larger numbers of students, at different levels of cost and benefit.

Therefore: blended learning frees up the conventional formats of resource-limited, time-constrained, and place-based education to offer a much wider range of formats, to a wider range of students, at a much larger scale of provision, and with very different cost structures to those of

---

3 The Course Resource Appraisal Model is open access and free to download at http://web.lkldev.ioe.ac.uk/cram/index.html

conventional learning. It is essential that universities develop a better understanding of these different cost structures.

It can be difficult to achieve the widely expected efficiencies in teacher time if we attempt to maintain a high quality learning experience for students. Modelling the teaching costs and learning benefits of a recent Coursera-based MOOC for teacher professional development showed that with a typically low proportion of students opting to pay the fee, and a low proportion of the fee coming to the institution, it is very difficult to make even a low-cost course, with no tutor assessment, break even (Laurillard, 2014a).

The analysis was carried out for the costs and income over three runs of the course, using the known data for the first run. We concluded that if we could double fee-paying participants on the next two runs, the course could just break even. However, typically, these courses attract far fewer students to later runs.

MOOCs have yet to deal with this conundrum:

- To persuade students to pay a fee to offset the costs of production and support it will be essential to offer properly accredited certification.
- To be able to do that the course has to meet the normal standards of assessment validity. We cannot yet automate assessment for most types of learning outcome. So these costs remain high.

For MOOCs to be viable in the long term, therefore, we need much more sophisticated design tools for supporting peer collaboration and assessment, automated assessment, and efficient tutor assessment. The teaching community could be engaged in this exploration, but so far have not been given the time, the incentive, or the support to do so.

An essential part of the role of institutions is therefore to take responsibility for understanding the new cost structures, learning benefits, and likely returns involved in developing and running large-scale open, online courses.

Inter institutional networking – national and international

National and international networking by universities has been slow to deliver the benefits of collaboration on the production of high quality teaching resources.

The OER movement has had some success but not the take-up envisaged. International networks such as Universitas 21, eMundus, and OER Universitas have the intention to share course resources, to improve quality and reduce costs.

The MOOC movement has led to these open resources being reused in other universities, which is seen as one of the potential sources of future income for MOOC producers.

However, none of these networks are seen as a strategic priority for the institutional members, all of whom focus more on inter-institutional competition than collaboration. It is too early be sure that this is likely to change in the near future. The Flemish universities would lose nothing by joining such networks, but they cannot yet be seen as a major force for progress.

6. The role of government and official bodies

Academic institutions are running on ever tighter budgets, so find it hard to invest. This is a situation that is mirrored in many countries, for every level of the education system, from national government, to local, to institution, to department, right down to the individual student – who manages this difficulty by borrowing in order to invest in their future.

This is what our expensive courses demand of our students. It is what every self-respecting organisation does: it invests in its core business. In addition to research, our other core business is teaching. We cannot ignore the imperative to invest in it, especially when learning technologies present such impressive opportunities for improving the way we conduct that business.

So at every level of the education system its leaders must imagine ways to invest that will drive innovation forward in a way that creates sustainable models for conducting education, and achieves all our ambitions for wider participation, higher attainment, collaboration with industry, and pro bono offerings.

Figure 3 imagines a rolling programme of innovation and adoption, at every level of education, building towards a system in which **every institution, and every teacher, is both specialist innovator and generalist adopter**, enabling education to become a learning system that can adapt to what will certainly be an ever-changing environment.

Phase 4: 2017-19

Phase 3: 2016-17

Phase 2: 2015-16

Phase 1: 2014-15

All institutions act as both ILs and LAs

LAs become ILs; Increase in ILs and LAs

Leading adopters (LAs) get help to transfer

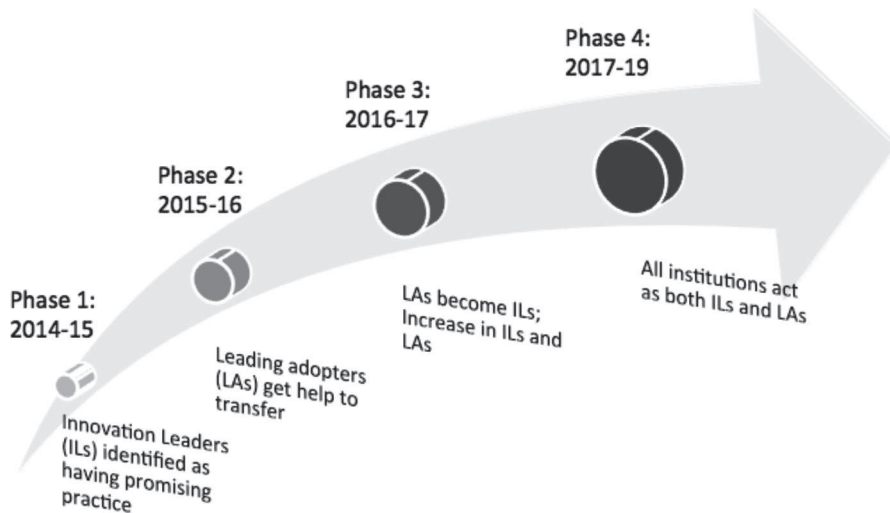Innovation Leaders (ILs) identified as having promising practice

Fig. 3. Timeline and milestones to integrate BL in a sustainable way.

Teachers and institutions need the signal from government and official bodies that it is important and valuable to invest their time and energy in blended learning innovations. At present the drivers they are responsible for prioritise the conventional, and have not adapted to prioritising the new and the digital. The ideas and innovations will develop bottom-up, but the recognition, incentives and rewards can only be top-down.

Potential for development cooperation

Universities compete in research, where collaboration is incentivised through research funding. They compete for students on the basis of their research, not their teaching. They could be incentivised to collaborate to improve the cost-benefit model for teaching and learning. Organisations like EADTU, EDEN, ICDE, and OER Universitas, for example, are working to promote collaboration, but it will not happen on the large scale without governing bodies promoting it.

The model for teacher professional development MOOCs could be replicated within a university and across universities, to orchestrate and support collaboration on the development of courses. This could be incentivised in the same way as research collaboration, with competitive funding for pedagogic innovation and new models for others to adopt. This is how Phase 1 of the rolling programme in Figure 3 could begin.

7. What are the challenges for HE and how could technology help?

For people to engage in innovation and change they must be able to see the difference it makes to their current practices and concerns. We collected many issues, problems and challenges from our discussions with the universities and the Expert Group, some of which are listed here. For each one there are ways of using digital technologies to contribute to solutions.

Transition to HE is poor for many students

→ Extend access to HE online resources and activities to schools; adapt undergraduate online courses as 'taster' courses for school students to choose and prepare for university study; use cross-university collaboration to develop 'HE preparation' courses that will benefit all universities.

Demand for quality HE is not being met on the current model

→ Use large-scale orchestrated student collaboration, peer review, and new digital pedagogies that can reduce the per student costs of quality HE.

Employers are dissatisfied with graduate skills

→ Use online collaborative projects to enable employers to influence the curriculum, and to enable students to link to the workplace.

Academics are interested in research rather than teaching

→ Link teaching to the existing online communities and practices in research to engage students in helping with research as an aspect of their study; reward innovation, exchange, and evidence of effective online teaching in a similar way to rewarding research.

Alumni need flexible continuing professional development

→ Extend access to HE online resources and activities to alumni; create alumni networks to collaborate and co-produce current knowledge and skills.

Whatever the strategic priorities a university leadership team develops, they should always ask 'how could technology help?' because it is so ubiquitous, and so versatile in its capabilities, that it can probably always make a significant contribution (Dede, 2013). Every senior team should have at least one member whose role is to advocate and investigate technology-based solutions.

8. Thinking it through

The KVAB wanted '*the development of a systemic vision on the optimal exploitation of ICT and the internet for the new learning of the 21ˢᵗ century'.* This paper has attempted to provide a systemic analysis. The systemic vision implicit in that analysis is to aim for

> Education to be a learning system that is capable of continual sustainable adaptation to an ever-changing environment.

This must not be another short-term reaction to a possibly disruptive technology. It may be that MOOCs survive, or disappear, or spawn many varieties. They will do something interesting, but whatever it is, there will continue to be new online technologies and digital tools capable of improving teaching, learning and assessment. For 20 years we have had these technologies and they kept improving, but we did not adapt in any significant way. Universities must now move to a new way of operating that allows us to keep renewing the way we use technology, just as books and writing allowed us to move on from oral methods of teaching.

What to do? Governments want more students achieving higher levels of attainment, at a lower unit cost (Henderikx, 2014). Technology promises that kind of efficiency upgrade for most industries, but frequently fails to deliver. Certainly, over the decades of technology innovation it has proved to be remarkably difficult to detect resultant increases in productivity, at least in the service sectors (Gordon, 2000).

Education is a different kind of industry, not a manufacturing industry that merely delivers content, not a service industry that puts its profit margins first, but a personal client-oriented industry that is centred on developing individuals to their highest capabilities. And it cannot be turned around by academics doing radical innovative design alongside the day job.

We have to imagine the education 'industry' as it needs to be – the vision of an adaptive learning system, for example – and then think through what it takes to get to that. In the KVAB's

Ethical Forum meeting they asked the Thinkers in Residence to address the question "Will university professors and universities become completely redundant in the near future as they can be replaced by Personal Computers and MOOCs?" My answer was "No, but the future of universities depends on our response to the challenges of digital technologies. The academy's response to blended learning will not be moral panic but *moral responsibility*". The teaching role of professors and universities is, ethically speaking, as important as our research role, so our teaching must be equally as innovative and goal-oriented as our research. We have a moral responsibility to think through what it takes for HE to be an adaptive learning system.

Here are some thoughts, following through from the analysis in this paper:

1. Focus on the education challenges, and then demand the most imaginative solutions from the technology, being aware of what it can do, and dreaming of what it might do.
2. Invite the HE Minister to require each HE agency to update the principal drivers in the education system to harness digital technology and so drive the development of new practices.
3. Create a Flemish university network to develop the enablers of leadership, TPD, communities of practice, technology-based tools, research evidence and shareable resources that will make the new practices effective.
4. Use academics' membership of a collaborative professional community to build the evidence-based understanding of teaching with digital technologies.
5. Use funding and quality drivers to require each level in the education system to invest in continual teaching and learning innovation, against expectations of returns
6. Invite every level of education to articulate how and why it uses technologies, as part of its accreditation and quality assurance, in terms of improvements in personalisation, flexibility, inclusion, and efficiency.
7. Create a time-dependent nationally accredited professional certification of teaching at all levels, in line with other high-skill client-service professions.
8. Create competitive R&D funding for blended learning innovation, part sponsored by the IT industry.
9. Create a professional development MOOC for academics in all the Flemish universities to develop a school-oriented 'HE preparation' MOOC, to assist in the transition to university study.
10. Use competitive funding for MOOCs to promote the discovery of the pedagogic innovation and new models that will ultimately create the differentiation factor in comparison with other universities.
11. Set up a national exercise to improve the understanding of the costs and benefits of conventional and digital teaching and learning methods and accreditation, Inviting institutions to present new financial models for teaching and learning.
12. Bring students and their representatives into the policy debates on the future of education, because it is their future.

Acknowledgements

References

Dede, C. (2013). Connecting the Dots: New Technology-Based Models for Postsecondary Learning. *EDUCAUSE Review, September/October,* 33-52.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7,* 95-105.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies.* London: Sage Publications.

Gordon, R. J. (2000). Does the 'new economy' measure up tp the great inventions of the past? *NBER Working Paper Series* (Vol. Working paper 7833): National Bureau of Economic Research.

Grainger, B. (2013). Massive Open Online Course (2013) Report. London: University of London International Programmes.

Henderikx, P. (2014). Higher Education Policy and Open and Online Education: The Netherlands: EADTU.

Laurillard, D. (2002). *Rethinking University Teaching: A Conversational Framework for the Effective Use of Learning Technologies* (2nd ed.). London: RoutledgeFalmer.

Laurillard, D. (2011). *Cost-benefit Modelling for Open Learning.* Moscow: UNESCO Institute for Information Technologies in Education.

Laurillard, D. (2012). *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology.* New York and London: Routledge.

Laurillard, D. (2013). Supporting Teachers in Optimizing Technologies for Open Learning. In J. Willems, B. Tynan, & R. James (Eds.), *Global Challenges and Perspectives in Blended and Distance Learning* (pp. 160-173): IGI Global.

Laurillard, D. (2014a). Anatomy of a MOOC for Teacher CPD (Vol. http://bit.ly/1xJ77jg). London: UCL Institute of Education.

Laurillard, D. (2014b). Anatomy of a MOOC: Design and outcomes of a professional development course. London: Institute of Education (forthcoming).

Proposal for a Digital Education Strategy
for Flanders Universities

Pierre Dillenbourg
Professor at the Ecole Polytechnique Fédérale de Lausanne (EPFL),
School of Computer & Communication Sciences

Contents

1. Academic tectonics

Many authors have described the sudden rise of MOOCs through the metaphor of a tsunami. I dislike this metaphor since tsunamis are destructive, but it conveys the force of the phenomenon, as well as the fears it triggers. Tsunamis, earthquakes and volcanoes eruptions are the visible scars of the deeper but invisible movement of tectonic plates. This applies to academia. The question is not whether Flemish universities should or should not produce MOOCs or how much technologies could enrich blended education. There is a slower, deeper more fundamental movement, namely, the evolution of universities in the digital era. Universities have already become digital entities but have not yet adapted their strategies to this reality. Online or blended education is only a facet of this evolution.

Universities have become digital entities because both science and society themselves have become digital. From astronomy to sociology, from theology to urbanism, today's science handles large digital datasets, captured in and stored by digital devices and from which we produce publications as digital documents. Lab instruments and notebooks, sensors used in field studies and scientific models are digital. Even the ethnographer who records video interviews in Amazonia and analyzes them with video analysis software lives in this digital space. As data became shareable, science reached an unprecedented scale, as for instance with the human genome. Society became data-centric: each individual has a digital shadow, the traces produced by his credit card, his phone or the videos that others took of them. For the worst and for the best, our world is digital.

This digital world nonetheless remains physical. The fact that we download music does not prevent us to attend concerts. Billions of books are printed on paper despite the fact that they are digital objects. Humans are animals with physical needs living in a physical world. University campuses still have lecture rooms, labs, cafeteria and sport facilities. Digital does not mean virtual. The digital world does not replace the physical space. Universities are made of two interwoven realms, the physical and the digital space. Campuses are both physical artifacts and digital entities, as robots or 3D-printed objects are.

This report invites university members to rethink their campus – and hence the education they provide – as digital entities. This invitation can be turned into a set of questions. How could the digital data available (or to be collected) enhance university functions, teaching and research? How can these analytics enhance decision-making at all levels of management, from the lab to the chancellor's office? Are the measurements that students produce in lab activities available in such a way that the teacher may include them in his next lecture (workflow)? If a student found the course X very interesting, could (s)he be informed that "75% of the students who appreciated course X also appreciated course Y" (social navigation)? Can a student select three successful alumni and ask the system to elaborate a curriculum based on their university path (recommendation systems)? Could a university predict the success rate of students based on their degree of participation in a broad set of activities, ranging from sport activities or online discussion forums (machine learning)? Instead of partitioning professors into rigid structures, such as institutes or schools, could university structures emerge from digital data: units could

gather scholars who published in the same journals or conferences and change every few years (social network analysis). Can the train schedule be adapted by knowing when each student currently on campus ends his campus day? These examples illustrate that that the impact of the digital revolution on universities is much deeper than producing online or blended courses. Even if this report focuses on the highly visible phenomenon of MOOCs, the invisible transformation of universities is more fundamental.

2. Observations

During this year, we – Diana Laurillard and/or me –visited all Flemish universities and UCL. We also had frequent interactions with the KVAB "Blended Learning" experts group, consisting of experts and stakeholders from universities, government bodies, industry and a student association. Our goal was not to elaborate a systematic survey rather we collected informal observations that influenced my recommendations (Section 3).

1. Learning technologies are commonplace in Flemish campuses. Blended learning ranges from the storage of slides to innovative pedagogical projects. The density of technology usage varies across universities and within universities. There remain – of course- ample opportunities to further enrich blended education, but, in a nutshell, **Flemish universities already integrate learning technologies in their teaching.** Continuing to improve blended learning is a valuable goal and this goal should be on the Universities agenda. However, this incremental process may not have a transformative effect. This is why I propose a more tangible shift towards MOOCs.

2. Up to now, **MOOCs are not a priority on the agenda of Flemish universities**. They have been discussed and some projects do exist, but without a strong commitment from the University leaders. In the management echelon of universities, many experts view MOOCs as a non-novelty, embellished by some hype, while some non-experts view them as a threat for campuses. Many universities face this dual culture, risk taking in research but risk aversive in education.

3. **Flemish universities have on their payroll the pedagogical and technical expertise required for a MOOC initiative**. In some cases, the technical and pedagogical expertise is distributed among several units, such as the 'e-Learning Center' and the 'teaching & learning center'. In some universities, there is both a unit that provides services to the university staff and some labs conducting research on learning technologies. These teams know each other and they do interact with each other, but more collaboration could create great opportunities.

4. **Flemish universities invest a significant amount of funding in blended education**. This funding takes various forms: grants for innovation in teaching, staff and licenses for the Learning Management System (LMS), etc. This funding is not fully available for launching a MOOC initiative, but, with some flexibility, it could be partly re-purposed, as explained later on.

5. There exist points of collaboration between Flemish universities regarding learning technologies. Various bodies, committees and institutions (e.g. KVAB) created working groups or produced whitepapers on learning technologies. Unfortunately, the expertise and responsibilities seem to be spread over many actors: **Flanders probably misses an entity that could act as the main reference for learning technologies**. Creating such an entity already was already a recommendation from KVAB in 2001

6. The integration of the former '**hogescholen**' into the university system has introduced a certain complexity in terms of geographical dispersion, the number of students, diversity of degrees, etc. My intuition is that these complex multidimensional campuses should not be managed in the same way as traditional campuses, but build upon the digital thinking presented in the introduction.

3. Why? 16 reasons for doing MOOCs

I see 16 reasons to start producing MOOCs. I structured them into 4 clusters.

Cluster 1: "Like it or not, it is happening."

1. *It is already there!* From the data I obtained from Coursera and EdX, I estimated[1] that about 50'000 persons have taken a MOOC in Belgium in 2 years. Citizens and students pick on the web anything they consider useful, including MOOCs, without asking anyone for the authorization to do so.

2. *Universities are losing control.* On the one hand, they lose control of who enters their digital teaching space. Participants join MOOCs, from teenagers to old ladies, without any control of pre-requisites. Employees in companies take MOOCs without asking their HR manager. On the other hand, what students learn is not restricted to what their university provides them. In lecture theatres, some students google their teacher's claims in order to verify them, others search YouTube for better explanations, etc. Students are no longer the prisoner of the professor assigned to them but may follow the MOOC of his colleagues.

3. *Universities are losing their semi-monopoly.* Citizens and students take whatever is useful and credible. Many engineers have already taken expensive training courses such as those for a "Cisco certified engineer". There is a growing diversity of actors who offer training, such as sport associations, NGOs, religious bodies, etc. To remain on the map, universities have to rethink what differentiates them from other training providers.

4. *There is no way back.* Nowadays, most university students take for granted that the teaching material (slides, examples, demos,…) is available on-line. Some students spontaneously record lectures when a friend is absent. Video has become an everyday substance: citizens record videos in any public event; they produce videos for wedding or parties, they ski or

---

1 Estimation made in April 2014.

cycle with a camera on their body, etc. I expect that, very soon, our students will complain if the videos of a course are not available somewhere. The current format of MOOCs may disappear, but the ubiquity of videos -in diverse forms- is only in its infancy. Video has become an everyday substance.

Story. DuoLinguo is a language learning platform that attracted 38 millions participants in two years. It proposes simple language learning activities. Access is being entirely free. What is striking is their financial model, which breaks away from any academic idea. The company uses crowdsourcing to translate into many languages the texts produced by other companies, such as CNN: the learners receive sentences to translate, beginners translating simple sentences and advanced students translating more complex ones. The quality of their translation can be checked since several thousands of them may be translating the same sentence. Using crowdsourcing to finance education maybe shocking from a Humboldt perspective, but this approach illustrates how far digital education may be different from the way we think our university teaching.

Cluster 2: "Better be an actor than a spectator!"

5. *MOOCs tickle the academic landscape.* In the US, the rise of MOOCs cannot be disassociated from the financial crisis of universities and from the huge debt that students accumulate during their studies. In Europe, MOOCs tickle the relationship between universities. On the one hand, they increase competition between universities by letting universities "fish" on remote territories. On the other hand, they facilitate collaboration between universities that can more easily than before build joint curricula.

6. *MOOCs may kill small universities.* MOOCs re-activate the debate between large and small universities, between research universities and teaching universities, etc. This question is not bound to MOOCs, but some scholars argue that small universities might disappear since successful MOOCs originate mostly from top universities. In contrast, small universities might benefit from MOOCs by giving a professor a worldwide visibility that he could not otherwise get from the reputation of his or her university. I don't know which of these two predictions is correct and how the European academic landscape will evolve in the next decade, but I am convinced that MOOCs will be one of the main factors of this evolution.

7. *Risk is an academic duty.* The previous point acknowledges that MOOCs constitute some risk for academia. Risks concern the financial impact of MOOC but also data privacy and intellectual property, etc. It is legitimate to estimate these risks before deciding to engage or not in MOOCs. However, the future is not foreseeable: the MOOCs of tomorrow do not exist; they will be what universities collectively invent. If universities are not willing to

take some risks, who else? University professors have a culture of risk taking in their research – writing ambitious research proposals with goals they are not sure to reach. Unfortunately, this culture does not expand to their teaching. It is time to upgrade education to the same level of entrepreneurship as research and MOOCs somehow contribute to this cultural change.

8. *The corporate world is going for MOOCs.* Corporate actors are very aware of the disruptive power of MOOCs, in terms of competition between actors but also internally. Moreover, MOOCs tickle the traditional organization of corporate training. For instance, if the employees following a MOOC on management are asked to provide examples of corporate silos, their homework provide the company management with highly valuable feedback on what is happening in the company. If a worker is invited to record a video of his excellent practice, this MOOC is not only a training resource but also a valorization tool for this worker. If a MOOC is designed for the company's customers, should it be produced by the training department or by the customer services unit? MOOCs bypass the usual perimeter of corporate training and yet many companies are exploring their potential.

Stories. A Scandinavian university invited its students who registered to the local course in SCALA, a programming language, to register instead to a MOOC given by an EPFL professor, Martin Odersky, who invented SCALA. Another university is currently negotiating with EPFL to buy two MOOCs and translate them in their national language for their own students. This is happening today. Academia may not like these tectonic movements but I don't see any way to stop them.

Cluster 3: "The current situation of universities is far from perfect, anyway!"

9. *University pedagogy is not very effective.* Lecturing is an effective method from the teacher's viewpoint, since the teacher may deliver a large amount of content in a limited time. It is less effective from a learner's viewpoint: learning is the side effect of processing information and listening requires a shallow processing of information. Eventually, students do learn because they engage in deeper processing outside lectures: they write summaries, they explain to each other, they do exercises, etc. Moreover, the exercise sessions – which are central to the engineering education – are also not very effective. Very often, students come unprepared and expect the teaching assistant to carry out most of the work. In both cases, tradition is not always synonymous with effectiveness. Some universities are radically engaged in reforms such as problem-based learning. MOOCs allow universities to explore various forms of pedagogy around the notion of a "flipped class": the registered students watch the lectures at home or anywhere and come on campus for richer activities with the teachers.

10. *The academic system is not as useful for the society as it could be.* The way students enter and leave universities is not optimal. In some disciplines, too many students enter university to get degrees that will not provide them with a job. In other domains, namely engineering and sciences, universities do not deliver the number of degrees that the economy needs. In all disciplines, many students fail the first academic year. This failure rate represents a huge waste of money for an educational system. After their studies, many students get jobs for which they have not been trained because curricula evolve more slowly than the market. I am not claiming that MOOCs will solve all these problems, but merely pointing out the space for improving current practice and systems.

11. *Teaching is not valuable for an academic career.* It is a common place to notice that research performance is the key factor for academic promotion. For many professors, teaching is more a duty than a priority. The professor is usually alone in a lecture theatre, teaching being almost a private activity. MOOCS make teaching public. This generates a stress for professors when they record their MOOC: any mistake will be publicly visible. However, this visibility is improving the academic status of teaching. It becomes a higher stake activity.

12. *Do tax payers understand academia*? Europe has the unique chance of publicly funded universities. However, this public funding is constantly threatened by the weaknesses of national economies. How many taxpayers perceive campuses as nice environments for privileged people rather than as an economic priority? Universities should make their contribution to society more visible. I am not talking here about the creation of start-ups or about collaborations with Flemish companies, even though these could be critical aspects of the MOOC strategy, but about training citizens concerning societal issues and providing lifelong learning to all Flemish citizens.

Story. My university, EPFL, has launched two successful introductory programming MOOCs, respectively in JAVA and C++. Teachers reported that, during exercises sessions, students would often ask questions on topics that they had just been taught in the precedent lecture. Their observations – not yet confirmed by robust empirical evidence- is that students who have watched the MOOC at home seem to be better prepared for the exercise sessions. Given the importance of the exercise sessions on the skills of our graduates, if the only benefit of MOOCs was to make exercise sessions more productive, this single effect would still justify the energy we invested in our MOOC initiative.

Cluster 4: "MOOCs create new opportunities"

13. *Scale is an opportunity.* The scale – the number of students- is perceived as a great opportunity in terms of opening access to education, but also at times as an impediment to pedagogical effectiveness. Some learning activities scale well: how much John learns

from watching a video or from answering quizzes will be the same whether there are 10 or 10'000 other students watching the same video. In contrast, some learning activities, manageable with small classes, do not scale up easily, for instance group discussions or solving ill-defined problems. At the same time, scale enables new approaches inspired by crowdsourcing. For instance, the peer grading mechanisms implemented in MOOCs provide some anonymity on a large scale. The pedagogical future of MOOCs is to invent new pedagogical methods that benefit from the new scale of education.

14. *Bologna is an asset.* So far, MOOC certificates are not accepted as equivalent to ECTS credits in most European universities. One reason is the rate of plagiarism in students' work. However, techniques for online-proctored exams are rapidly improving. Sooner or later, on-line tests will be as reliable or even more reliable than on-campus exams. When this will be the case, Europe will have a unique opportunity to build the largest educational ecosystem, since it has already the currency for sharing courses, the ECTS credits, as well as the basis for collaboration, the Bologna treaty.

15. *MOOCs can boost educational research.* MOOCs expand the methodology of educational research. The empirical methods used for many years on education research can now be applied at large scale by MOOC platforms (A/B testing). The massive accumulation of learning traces can feed machine learning algorithms. Learning analytics brings education to the era of large-scale inductive science that is already shaping many other sciences. The movement of 'open analytics', i.e. sharing empirical data across labs worldwide, mimics the phenomena that boosted other sciences one decade ago. In the future, educational research should not be only conducted by educational scientists, but by any scholar involved in education.

16. *Visibility.* I deliberately left this point as the last one, because it has been over-emphasized. Nonetheless, like it or not, universities compete for the best teachers and the best students. Universities and individual professors are concerned by various indices of visibility such as their number of citations, rankings, H-factor, etc. MOOCs participate in this measure of worldwide visibility and I expect them to be soon integrated in international university rankings. If this was the only reason to do MOOCs, it would not justify the effort. But, this visibility is a positive side-effect of MOOC efforts.

Story. How do you teach a course on Venice? Typically, a history teacher would show traces, pictures, movies and maybe bring students to Venice. EPFL is working on digital environment called the "Venice Time Machine": Venice was a bureaucratic city that recorded in huge manuscripts all construction works, the contents and passengers of all boats entering or leaving the city, etc. The project aims to scan the kilometres of archives using tomography (manuscripts cannot be manipulated by automatic scanners) and thereby to offer to students a unique environment to navigate through the history of the city of Doges.

4. What? 8 project proposals

The previous section provided reasons to engage into the production of MOOCs. However, if Flanders universities would simply start producing a few MOOCs in 2015, this would not generate the same visibility as for those who started in 2012. Therefore, I recommend instead launching an ambitious initiative that positions Flemish universities as front-runners in digital education. The term "ambitious" may refer to various challenging goals. I describe some of them hereafter, among which universities could pick local priorities or the government could identify Flanders priorities.

Create a brand associated to a positive learning experience

I recommend Flemish initiatives to strive for courses and degrees that have a higher quality than average MOOCs, creating some kind of "brand" for digital education. The quality of a MOOC is often estimated by the quality of the contents presented and, to a lower extent, by the sound and image quality of the video. I expect that MOOCs will converge to a certain quality standards in terms of video: MOOCs that are below the standard won't attract students, but the investment to produce higher video quality will not necessarily generate more participation or better learning. Instead, I hypothesize that other elements will create a difference from other MOOCs, namely the quality of activities (e.g. using a high-fidelity simulation), the social dynamics among learners and the individual support to participants (coaching, personalized feedback,…). The report produced by the other member of the Thinkers-in-Residence program, Diana Laurillard, proposes methods for high quality digital education. Altogether, MOOCs will be valuable if they provide participants with a positive learning experience. This brand can be associated with one specific university or to the Flanders academic system in general.

Improve the transition to university

I do not believe that MOOCs are the magic response to all academic problems, but a MOOC strategy is more robust if it addresses problems than if it relies only on the mythic notion of innovation. The energy invested in digital education should be devoted to the problems of the academic system such as failure rates in the first year, the lack of students in some curricula (e.g. engineering) and the mass of students in other curricula (e.g. psychology). I recommend that Flemish universities could collaborate to prepare 10 MOOCs, i.e. 2 MOOCs in each university. The first 5 MOOCs would address university pre-requisites in mathematics, physics, biology, chemistry and computer science. The next 5 MOOCs will cover the content of the first university years in the same domains. They would be integrated with on-campus exercises sessions in order to increase their effectiveness.

Improve the effectiveness of on-campus exercises and lab sessions

Exercises sessions and lab activities are critical components when training engineers and scientists. Yet, they are often criticized by students as being poorly related to theory presented during the lectures. In addition, students tend to behave passively during exercises: many come in order to get the solution instead of trying to solve the problem on their own. MOOCs offer solutions to make these on-campus activities more productive. EPFL experience seems to indicate that students tend to come better prepared to exercise sessions, having digested the theory. For labs, two types of MOOC could be developed. "Lab Debriefing" MOOCs: the data collected in a physical lab can be stored in a database that feeds the next MOOC activities, where the teacher explains what the students are supposed to have learned. "Lab Passport": in many universities, students and new staff are required to follow short specific courses before using scientific equipment, e.g. how to operate safely a laser, how to sterilize containers, etc. These courses have to be repeated many times every year, which justifies a MOOC. Moreover, since equipment is rather similar across universities, these MOOCs could be developed collaboratively.

Increase academic agility

The stability of academic curricula creates cultural references: employers know more or less what they can expect from a civil engineer or an art historian. I do not suggest to abandon these core curricula but propose, in addition, to create smaller curricula that can be elaborated rapidly according to the evolution of the market. These can be certificates at the masters level on topics such as a mobile computing, medical sensing, counter-terrorism, racism, flying robotics, etc. The notion of "agility" refers to the time and energy needed to build these new certificates. To fasten the design and launch of new curricula, I recommend (1) a "fast track" process (not going through the usually slow curriculum revision processes), (2) to involve researchers, namely postdocs, in content production, (3) to collaborate with other universities. Typically, these small curricula correspond to the mission of continuing education assigned to universities. They are expected to generate revenues. They can be conducted in a blended way, e.g. ending by a residential seminar, especially for the MOOCs conducted in Flemish.

Reduce unemployment

Despite the fact that unemployment is low in Flanders, I recommend the Flemish government to fund a MOOC-program focusing on employability. This initiative would first develop mechanisms for detecting training needs among SMEs, by monitoring social networks and analysing the questions raised in MOOCs. While large companies often have a corporate training strategy, this is often not the case for SMEs. Second, the initiative would elaborate rapidly some online nano-curricula focused on these specific needs, as explained in the previous point. I would recommend Flemish universities to involve the former "hoogscholen" in this mission.

Involve citizens

The citizens who are or have been at University represents only a small fraction of the Flanders population, i.e. of the tax payers. In times where public funding of Universities is facing the need to reduce national debts, I recommend Flemish universities to make their usefulness to the society more visible, namely to make knowledge available to Flanders citizens in **a non-academic format**. This can probably be done in collaboration with other media (e.g. VRT). In the key public debates such as the changes in energy production or immigration, there is no such thing as an "objective viewpoint". Nonetheless, a rigorous and scientific approach, based on empirical evidence, would certainly contribute in a positive way and, in return, discard the image of university campuses as places for privileged people.

Build Alumni Networks

European universities have only recently started to develop alumni networks, which are critical in the funding of American universities. One way to maintain relationship with alumni is to offer lifelong services such as a permanent email address or MOOCs that refresh on a 5 yearly basis the knowledge they acquired during their university studies. As suggested by G. Vandeperre, this offer would be like a "diploma with a service contract".

Contribute to teacher training

Many high school teachers have left university many years ago, while their scientific domains, such as biology, continue to evolve rapidly. Universities should provide a regular refresh of their domain expertise. This could be developed as collaborative MOOCs (cMOOCs) around teacher communities.

5. How? 8 suggestions regarding organization

To pursue the challenges mentioned in the previous section, I express now some recommendations in terms of structures or organisations.

Start from the top management

On the one hand, the production of MOOCs is a bottom-up process: they only exist if, at some point, a professor decides to invest a significant amount of time. On the other hand though, this engagement will remain sparse if MOOCs are not highly valued by top management, especially the rector of the university. The success of a MOOC initiative depends upon the consistency of the vision across all levels of the institution, from rectors to deans, professors, researchers and technicians. If a rector does not consider digital education as a priority for the

development of his or her university, I would recommend not launching such an initiative. I also recommend including in the university board a vice-rector for "digital campus", who would coordinate all university efforts in that direction.

Just do it

A reasonable way to launch a MOOC initiative would be to gather a committee that will define objectives, elaborate a strategy with actors, resources and responsibilities and, once, this is done, to start producing MOOCs. This committee is proposed hereafter. However, I propose starting immediately with the production of MOOCs and building a reflection group in parallel. Deep reflection does not replace experience, because several phenomena emerge in MOOCs that could not be predicted despite experience. Indeed, many of those – students and professors-who voiced a negative opinion before we launched MOOCs at EPFL two years ago actually changed their mind once they experienced a MOOC. A priori opinions were mostly based on fears that rapidly fade out. I recommend devoting 100 K Euros/Year per university to the MOOC strategy. This budget, combined with suggestion (3), would be enough to produce 2-3 MOOCs per year and to learn from experience.

Repurpose part of the resources currently engaged in digital education

As mentioned earlier, each Flemish university has already parts of what is necessary to address the ambitious goals listed in the previous point. In terms of human resources, each university includes teams that manage the learning management systems, as well as the teams that support teaching activities (e.g. "center for teaching and learning"). These teams possess expertise in technical as well as pedagogical aspects of digital education. Moreover, some universities have research teams in educational psychology and in computer science that are of international renown in digital education. These teams seem to have been somehow more sceptical than enthusiastic about MOOCs, but this scepticism is a healthy attitude needed to filter out the hype around MOOCs from what is pedagogically valuable. Concerning financial resources, the "total costs of ownership" of learning management systems is far from being negligible and could also partly be oriented towards MOOC initiatives. I do not claim that repurposing is easy to implement. It has to be smoothly introduced since many prior engagements have to be fulfilled. My point is that the ambitious goals described in the previous section could appear utopic if universities started from scratch but that they become realistic if one takes into account the current level of development of digital education in Flemish universities.

Elaborate an educational strategy, globally, not a strategy restricted to MOOCs

The initiative should not focus exclusively on MOOCs, but include all channels by which knowledge produced in Universities is transmitted to students located on campus or off campus. A course may include any combination of on-line and face-to-face activities, depending upon the

constraints of the target audience and the learning objectives. This global approach allows identifying synergies between various training offers: the set of digital and physical resources produced for a course can be restructured for another audience without duplicating the effort.

Deliver official certificates

So far, the level of plagiarism prevented most universities from giving official credits to students who complete a MOOC. Sooner or later, the biometry techniques of online-proctored exams will be as reliable – or even more reliable than on-campus exams. Then, if universities give ECTS credits, Europe could – thanks to Bologna- offer something unique. In the meanwhile, Flemish higher education institutions could become a network of testing centres such as no student would have to travel more than 30 minutes to pass an exam.

Launch a research initiative on evidence-based education

There exists great research expertise in educational psychology and learning sciences in Flemish several universities. Yet, this excellent research only has a minor impact on university teaching. MOOCs led to a renaissance of evidence-based education. The initiative could consist in creating an interdisciplinary research center that integrates the existing expertise in empirical educational research with the power of learning analytics, or in launching a research funding scheme, managed by the Flemish Science Foundation.

Create a Digital Universities Committee

Some projects mentioned in the previous section can only be conducted if several universities collaborate. If each University has a new vice-rector whose mission is to re-think the digital campus (recommendation 1 in this list), they could together become the Digital University Committee (DUC). Administrative staff of VLIR or KVAB could provide the administrative support for this committee. In addition to the collaborative projects mentioned before, e.g. joint curricula or transition programs, this committee would have missions that are better tackled collectively:

- To negotiate an agreement with a MOOC provider in order to enable all universities to run open online courses. It has become difficult or expensive to join some platforms. I recommend resisting to the temptation to develop a new platform.
- To define the conditions under which a MOOC may lead to ECTS credits.
- To negotiate with the Flanders Science Foundation to launch a research initiative on evidence-based education or to create a learning science institute.
- To negotiate with OUNL (next point)

Creating this committee is not a condition to start the other projects. This recommendation should not be used as an alibi for slowing the down the pace of the MOOC initiative.

Rethink the partnership with the Open Universiteit Nederland (OUNL)

OUNL has a fantastic experience in online education as well as a rich network of centers. It does not however have the scientific reputation of universities such as KU Leuven. It would a mistake for Flanders Universities to "outsource" in some way their digital education to OUNL. I would rather recommend rethinking deeply the partnership with OUNL. Some inspiration may come from the Open University Australia, which is actually owned by standard universities. In simple words, MOOCs are turning all universities into "open universities", which generates new forms of computation but enables new forms of collaboration

Acknowledgements

This document does only reflect the opinions of its author. It is neither an official statement from KVAB nor from the author's institution, EPFL. Version of January 6th 2015.

Epilogue: Will universities survive the e-learning revolution?

Selective synthesis and personal conclusions of the 13th Ethical Forum
of the University Foundation, Brussels, 20 November 2014

Philippe Van Parijs

University of Louvain, Chaire Hoover d'éthique économique et sociale

Prologue

Ever since their medieval birth, universities have been communities of scholars and students sharing a place and a time for the sake of teaching and learning. 21st century technology has made physical proximity unnecessary for instantaneous verbal communication and multiplied the ways in which learning can be organized and supported. Sophisticated MOOCs (Massive Open Online Courses) constitute only one, among the most glamorous, of the many manners in which this potential is being exploited.

Can this and other forms of e-learning be expected to keep growing at the expense of traditional face to face teaching? Will they gradually turn the university into some form of Open University? How will they affect the role and status of local university professors and their relationship to their students? How can they be coupled with a fair and efficient assessment of student performance? Will they lead to the equalization of higher education thanks to costless access to up to date high-quality courses? And/or will they deepen the gap between top and peripheral universities: whereas the former would gain attractiveness by increasing the fame of their star professors and mass revenues by delivering certificates for the courses they provide, the latter would be turned into their sheer intellectual subsidiaries?

For short: does e-learning provide a fantastic way of making high-quality higher education available at all times, at all ages and in all places? Or will it irreversibly undermine some essential aspects of university education and life, inseparable from a shared space and time, while further boosting global inequalities?

These are the many questions guest speakers and audience were invited to think about at the 13th Ethical Forum of the University Foundation.[1] It quickly became clear that the real subject of the day was a three-dimensional space, with the MOOCs in the strict sense occupying one of the

---

1 The present text is an edited version of the oral conclusions improvised at the close of the Forum, on 20 November 2014. I am particularly grateful to Michel Gevers and Georges Van der Perre, who master-minded the event itself and its connection with the "Denkers" programme of the Flemish Academy of Sciences, selected first rate contributors and framed the event in such a way that it could provide a well informed and fruitful discussion of the most fundamental issues raised by the e-learning revolution. I am also most grateful to all speakers and to several other participants for many valuable insights, only some of which are explicitly echoed in this selective and subjective synthesis.

angles. The first dimension relates to the "M": how *massive* a Massive Open Online course is can vary greatly: from tens of thousands of students scattered around the world who stick it out to the end all the way down to a captive audience of a couple of dozens local students obliged by their professor to watch him on a screen. The second dimension relates to the first "O": how *open* a Massive Open Online course is can also vary significantly, for example in terms of constraints motivated by privacy concerns on the public identification of students who participate actively in the course, with a major impact on potential interaction between students and on data mining for the purpose of educational research. Finally, the third dimension relates to the second "O": how *online* a Massive Open Online course is can vary greatly, depending on the extent to which the online aspect is *blended*, i.e. supplemented by face-to-face interaction in the auditorium or the class room.

1. Community

What are the most fundamental issues that arise as our higher education system is tempted to move closer to the MOOCs angle of this three-dimensional space? The first one relates to *community*. Decennia later, I remember vividly the charm of belonging to a real community of scholars and students. In my Oxford College, even graduate students had to ask permission from their "moral tutor" if they wished to spend a night more than ten miles from Carfax (the town centre) at any point during the three times eight weeks of every year of their compulsory residence period. You saw the dons (the fellows of the College) and your fellow students at lunch and dinner in Hall, you ran against them among the shelves of the cosy College Library, you met them at regular sherry or garden parties, and you participated in an intense social life largely structured by segregated Common Rooms and college sports teams.

Thanks to proximity and simultaneity, this is what you could really call an academic community, creating tight intellectual and personal bonds that may last for life. MOOCs, by contrast, entail what Diana Laurillard aptly described as"the irretrievable loss of shared time and place". Is this a real loss? Undoubtedly. Is it worth paying? Yes, I have been persuaded that it is. Why? For one fundamental reason: our higher education will need to be increasingly designed primarily for life-long learning rather than for a few cohorts of young adults. Unlike the latter, those involved in the former cannot plausibly be expected to study full time in a shared location.

Why should we expect such a shift? Why should we promote it? For the three interrelated reasons usefully listed by Olivier De Schutter: the speed of technological change, the instability of the international division of labour and the growing discontinuity of individual careers. And also, arguably, for a fourth one: the rise in life expectancy. As Diana Laurillard and Peter Sloep emphasized and documented in light of their personal Open University experience, any major new step in information and communication technologies was eagerly seized by people involved in continued education, and MOOCs will not be an exception. For people wishing to benefit from higher education without relinquishing their professional and family obligations, commonality of space and time is generally a luxury they cannot afford.

As life-long higher learning takes precedence over starting-block tertiary education, universities will need to abandon the model of the medieval *universitas* of teachers and learners from which any deviation required an excuse, and embrace wholeheartedly a technological potential that would arguably provide only a marginal improvement for a starting-block audience but offers a mind-boggling tool for life-long learning. What universities should adopt as their ideal, in this perspective, is no longer to offer their students the temporary proximity of useful books and caring tutors but to enable students worldwide to appropriate, use, process throughout their lives the ever growing mass of knowledge that is available at little or no cost on the internet. This mass of knowledge is incomparably broader and richer than anything the best library and the best tutors of the best college of the world could ever have provided to their privileged students. E-learning is essential to exploit its potential to the full far beyond a small circle of privileged people in privileged countries.

2. Quality

This directly leads to a second issue: *quality*. Throughout the Forum, speakers have stressed that the effectiveness of MOOCs, i.e. their quality as a teaching method, is enhanced if they are coupled with face-to-face local interaction. Why is this the case? Not because the reliable evaluation of student performance necessarily requires some physical presence: Pierre Dillenbourg assures us that online student identification will soon be safer than identification in our examination rooms. Rather because because the effective assimilation of what is available online works better if it is locally "orchestrated" (Laudrillard) by teachers one can talk to, and perhaps also, as pointed out by a participant from the European Commission, because some types of skill or competence (as opposed to sheer knowledge) can only be learned through face-to-face interaction. Optimal onlineness, in other words is not maximal onlineness. It is blended learning.

Beyond this consensus, disagreements subsist regarding the advantages of onlineness for the online part of the learning process. On the one hand, live interaction with class mates and teachers who are real persons can make a difference to the quality of the learning process. As forcefully put by Bart Pattyn, an extremely valuable part of the pedagogical relationship of connivance and trust is unavoidably lost when teachers address an impersonal camera and students watch them miles away on an impersonal screen.

On the other hand, Diana Laudrillard pointed out that students are less inhibited on the web than in the class, and Olivier De Schutter mentioned the pedagogical interest of an online forum for a course on human rights with participants from all over the world. More generally, the sheer fact that a MOOC is durably visible by anyone, from the teacher's multinational peer group to his/her rector, immediate colleagues and children, is bound to elicit greater effort into a MOOC than into a course that is attended just once and behind closed doors by a handful of students, or at most a few hundreds. Moreover, owing to self selection and selection by users, the average pedagogical talent of the teachers who go and remain online is bound to be higher than average.

3. Equality

This takes us to a third theme: inequality, and first of all inequality within institutions. Only some teachers will provide courses online and a subset of them will be particularly successful at it. This will lead, Bart Pattyn argued, to a salient hierarchy with a new upper class of potentially arrogant star professors. I believe he is right. Worse still (certainly in his view), the easy availability of quantitative data will quickly lead to the computation of more or less sophisticated indices, just as happened in the case of research: number of students registered for a course, number of students completing it, ratio of the latter to the former, rate of increase of this ratio, etc. And once such indices are at hand, rankings are around the corner, with all the usual perverse effects in terms of neglect of the other dimensions of our jobs that do not enjoy the same level of salience. All this may well be true, but it is not as negative as it sounds. As we well know, such an academic star system already exists, but it is dominated by research performance (or whatever is being measured under this label). All things considered, therefore, the extension of stardom to good teachers may help correct a regrettable imbalance. It may induce a long overdue redirection of valuation and motivation towards the teaching part of our academic job. If you want to be famous – and useful – beyond the walls of your own institution, you will no longer need to neglect your teaching.

What about inequality between institutions? Some participants suggested that MOOCs will reduce it. Most universities, they argue, are bound to provide first-rate teaching at some level and in some domain, and MOOCs will enable them to show it to the world. They may not be able to boast top researchers, but teaching, possibly only at basic levels and in a subset of subjects, is something all of them can be expected to do well. Perhaps, but is this not a short-sighted view? The reason why top universities attract top researchers is that having top researchers is very visible, which makes it easy for them to spot them and important for them to snatch them. Thanks to MOOCs, it is not only top researchers that will become very visible, but also top teachers. And there is therefore every reason to expect the magnet mechanism to start operating far more than now in this dimension too, thereby deepening further the existing hierarchy.

More important than the issues of inequality between the individuals and institutions that provide higher education, however, is the issue of inequality between the latter's (potential) recipients. MOOCs, Guillaume Miquelard-Garnier argued, are good for a minority of better students, but worse than traditional teaching for all others. Various statistics were cited at the Forum about the educational and economic bias among the beneficiaries of MOOC courses. Student Sarah Cardinal's experience at the Hainaut campus of the University of Louvain is instructive in this respect. She mentioned that she spent over six hours watching each weekly instalment of the MOOC she followed, as she kept pressing the pause button in order to take notes and better absorb the material. She could do so comfortably in her home environment. What about students without a personal computer or without an internet connection? There is a computer room at their disposal on campus, she explained, and access to each week's MOOC instalment is thereby guaranteed, but – needless to say – not quite as comfortably as in the tranquillity and cosiness of one's home, with a good computer and a good connection.

This local experience provides an insight into a mechanism through which the generalization of MOOCs may tend to increase inequalities between students. But it should not make us lose sight of the broader picture. In less developed countries, according to Olivier De Schutter, the easy availability of high-quality courses shows signs of generating more demand for higher education and of triggering a pressure for more investment in the material infrastructure required to benefit fully from what is made available in this way. More generally, as awareness and mobilization of the new technical possibilities spread, the wish and capacity to take advantage of the supply of MOOCs and less ambitious forms of e-learning should quickly trickle down, and – largely but not only thanks to continued education – less advantaged sections of the population, locally and worldwide, should gradually become their main beneficiaries.

4. Diversity

Last but by no means not least present at our Forum, there is the issue of *diversity*. Note, first of all, that the spreading of MOOCs is bound to boost and depress diversity at the same time. It will boost diversity in the sense that the variety of courses available at any particular institution will grow as a result of no longer being limited to the local supply of teachers. But it will depress diversity in the sense that the distinctiveness of the various institutions will pale as a result of a growing overlap between what is available in each of them. Average local diversity will swell for exactly the same reason as inter-local diversity will shrink. This forces us to think – as we also need to do when we say that we value linguistic or cultural diversity – about whether it is local or inter-local diversity that we find most important.

What is denounced as a threat generated by the MOOCs, however, is probably less the shrinking of inter-local academic diversity in itself, than the specific form it takes: "Americanization". Pierre Dillenbourg tried to convince us that this is not what is happening, by showing on a striking map how many people located in North America have been following MOOCs produced by the Ecole polytechnique fédérale de Lausanne (EPFL), whether taught in English or in French. The map persuasively showed that an EPFL-ification of the world is also on the way. What it did not show, however, is how much the EPFL had to teach in the American way (not just linguistically) in order to achieve the level of penetration shown. Nor did the map show how little trans-Atlantic MOOC travelling there was in the East-West direction, notwithstanding the EPFL's impressive achievements, compared to the truly massive West-East traffic. The accusation of Americanization, therefore, cannot be so easily dismissed. Nor can the even more damaging accusation of neo-colonialism, as proffered for example by the South African authorities when they decided not to join the MOOCs initiative.

Yet, the strength of these accusations should not be overstated. For what "Americanizing" or "neo-colonial" MOOCs are competing with and at risk of erasing often does not consist of valuable cultural specificities, but rather of no less "American" or "colonial" knowledge, simply outdated in both content and form. To the extent that this is what is going on, it must be regarded less as a reduction of diversity than as an improvement in quality, by the very standards of what is being replaced. Analogously, the transnational convergence of view that Olivier De Schutter said

could be observed in the forum of his Human Rights MOOC may admittedly be interpreted as a loss of diversity, but it is arguably not one that should be deplored.

Nonetheless, there is are losses of diversity that may be regarded as regrettable. For example, in the French-language Political Science MOOC which Sarah Cardinal followed, any parochial reference to Belgium's institutions and political life had to be omitted, so as to make it intelligible and no less relevant to students located anywhere in the *francophonie*. More fundamentally, there is the loss induced by the tendency to adopt the same language as the medium of instruction. To be truly massive, a MOOC cannot be taught in Danish, Dutch or even French. It needs to be taught in English, with reading lists often consisting exclusively of English publications. In some domains this is anyway unavoidable as all the relevant literature is in English. In other domains, the expansion of MOOCs will further increase the overexposure of what is written and written about in English relative to what is written and written about in other languages. This will involve a genuine and no doubt regrettable loss.

Epilogue

Decrease in community in some sense, in some aspects of quality, in equality within and between institutions, in diversity between institutions and countries, these are all likely effects of the spreading of MOOCs which one might sensibly deplore. Are these just collateral damages of an important step forward or are they decisive objections that justify fierce resistance? In the light of the Forum's rich discussion, some core elements of which I tried to summarize above, I incline towards the former. Why? Essentially, as explained above, because of the great importance I attach to the development of lifelong learning.

For MOOCs to play their role well, they do not need to be very massive, nor to be entirely open. And they certainly do not need to be exclusively online. They will constantly need to be designed and redesigned, blended and re-blended. Until when? Until when we get them right? We shall never get them right, if only because what is right for one subject for one audience at one time is not right for another subject, a different audience, at a later time. This should not stop us experimenting, reflecting on new developments and discussing them in the light of our ultimate objectives – as we did at this Forum. But whatever unexpected new forms technological innovation will give to our teaching, they must never be allowed to spoil the pleasure we take when we manage to get our pupils, strong or weak, to grasp what we sometimes had a very hard time understanding ourselves.

This is the pleasure that keeps making our job as teachers – all the way from the *kleuterschool* to the *université des aînés* – one of the world's most wonderful jobs. This is the pleasure that must enable our universities to survive all upheavals, including the e-learning revolution.

RECENTE STANDPUNTEN (vanaf 2013)

17. Hendrik Van Brussel e. a. – *De maakindustrie, motor van welvaart in Vlaanderen*, KVAB, Klasse Technische Wetenschappen, 2013.

18. Hubert Bocken (ed.) – *De gerechtelijke hervorming. Een globale visie*, KVAB, Klasse Menswetenschappen, 2013.

19. Georges Van der Perre, Jan Van Campenhout e.a. – *Van* Blended *naar* Open Learning*? Internet en ICT in het Vlaams hoger onderwijs*, KVAB, Klasse Technische Wetenschappen, 2013.

20. Jan Velaers – *Federalisme/confederalisme, en de weg er naar toe*….KVAB/Klasse Menswetenschappen, 2013.

21. Karel Velle – *Archieven, de politiek en de burger*, KVAB/Klasse Menswetenschappen, 2013.

22. Etienne Aernoudt, Dirk Fransaer, Egbert Lox, Karel Van Acker – *Dreigende metaalschaarste? Innovaties en acties op weg naar een circulaire economie*, KVAB/KIasse Technische Wetenschappen, 2014.

23. Roger Marijnissen, Francis Strauven – *Voor een verantwoord beheer van ons kunstpatrimonium*, KVAB/Klasse Kunsten, 2014.

24. Jan Eeckhout, Joep Konings – *Jeugdwerkloosheid*, Denkersprogramma Klasse Menswetenschappen, 2014.

25. Pascal Verdonck e. a. – *Medische Technologie, als motor voor innovatieve gezondheidszorg*, KVAB/Klasse Technische Wetenschappen, 2014.

26. Charles Hirsch, Erik Tambuyzer e. a. – *Innovatief ondernemerschap via spin-offs van kenniscentra*, KVAB/Klassen Natuurwetenschappen en Technische Wetenschappen, 2014.

27. Giovanni Samaey, Jacques Van Remortel e. a. – *Informaticawetenschappen in het leerplichtonderwijs*, KVAB/Klasse Technische Wetenschappen en Jonge Academie, 2014.

28. Paul Van Rompuy – *Leidt fiscale autonomie van deelgebieden in een federale staat tot budgettaire discipline?* KVAB/Klasse Menswetenschappen, 2014.

29. Luc Bonte, Paul Verstraeten e. a. – *Maatschappelijk verantwoord ondernemen. Meedoen omdat het moet, of echt engagement?* KVAB/Klasse Technische Wetenschappen, 2014.

30. Piet Van Avermaet, Stef Slembrouck, Anne-Marie Simon-Vandenbergen – *Talige diversiteit in het Vlaams onderwijs: problematiek en oplossingen*, KVAB/Klasse Menswetenschappen, 2015.

31. Jo Tollebeek – *Metamorfoses van het Europese historisch besef, 1800-2000*, KVAB/Klasse Menswetenschappen, 2015.

32. Charles Hirsch, Erik Tambuyzer e.a. – *Innovative Entrepreneurship via Spin-offs of Knowledge Centers*, KVAB/Klassen Natuurwetenschappen en Technische Wetenschappen, 2015.

De volledige lijst met standpunten en alle pdf's kunnen worden geraadpleegd op
www.kvab.be/standpunten.aspx