



UvA-DARE (Digital Academic Repository)

Higher Education in a Networked World: European Responses to U.S. MOOCs

van Dijck, J.; Poell, T.

Publication date

2015

Document Version

Final published version

Published in

International Journal of Communication : IJoC

[Link to publication](#)

Citation for published version (APA):

van Dijck, J., & Poell, T. (2015). Higher Education in a Networked World: European Responses to U.S. MOOCs. *International Journal of Communication : IJoC*, 9, 2674-2692. <http://ijoc.org/index.php/ijoc/article/view/3398>

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Higher Education in a Networked World: European Responses to U.S. MOOCs

JOSÉ VAN DIJCK

THOMAS POELL

University of Amsterdam, The Netherlands

Since 2012, platforms for massive open online courses (MOOCs), such as Coursera, Udacity, and edX, have had a considerable impact on established forms of higher education, both online and off-line, private and public. What are the technocommercial and sociocultural dynamics underlying the organization of MOOCs? This article first describes how MOOCs are built on the same mechanisms underpinning the overall ecosystem of connective platforms. Second, it inventories how European public universities have responded to MOOCs. Finally, the article theorizes how the surge of global online MOOCs impacts the definition of higher education as a public good. To sustain public systems of college education, governments and university administrators will need to address the networked infrastructure that undergirds national and global alliances.

Keywords: MOOCs, online education, higher education, social media, public education, e-learning, distance learning, privatization, globalization

Introduction

Since 2012, massive open online courses, or MOOCs (e.g., Coursera, edX, Udacity), have entered universities and raised fundamental discussions between teachers, university administrators, students, and entrepreneurs about the future of higher education in a globalized online environment. Some academics and university administrators have lauded MOOCs as tools for revolutionizing higher education, while others see them as potential mine fields. An important yet undertheorized aspect of this debate is how MOOCs function as part of a much broader culture of connectivity (Van Dijck, 2013a). The interdependencies between social networks, sharing economy platforms, and MOOCs are rooted in the same technical and economic principles. In this article, we analyze the dynamics underlying the development of MOOCs in the context of an emerging global social Web where these courses are implemented in systems of higher education that are often institutionally grounded and largely nationally based. As media scholars, we want to understand how emerging commercial online infrastructures affect public systems such as higher education.

José van Dijck: j.van.dijck@uva.nl

Thomas Poell: tpoell@uva.nl

Date submitted: 2014-10-22

Copyright © 2015 (José van Dijck & Thomas Poell). Licensed under the Creative Commons Attribution Non-commercial No Derivatives (by-nc-nd). Available at <http://ijoc.org>.

First, we describe how Coursera, edX, and Udacity are built on the same mechanisms underpinning the ecosystem of connective platforms: datafication, (algorithmic) selection, and commodification (Van Dijck & Poell, 2013). The new technocommercial geometry built on this ecosystem is bound to remap the relations between learners, teachers, and institutions. MOOCs are driven by reputational systems of peer voting and popularity rankings; *learning* processes are translated into *data* processes and turned into tradable units. In addition, MOOCs are staked in the same business models that dominate social media platforms: offering “free” courses in exchange for user data and generating additional revenue through “premium” services. An analysis of the ways in which MOOCs incorporate social media mechanisms reveals how these new platforms affect the pedagogical and economic value of (institutional) college education.

Beyond pedagogy and economics lies the question of *education as a public good*: How do MOOCs relate to key public values—sustaining systems of higher education in the United States and Europe? On both continents, MOOCs are subject to fierce contestation—mostly disputes about the core values of higher education, including privacy protection and academic independence. These disputes understandably differ on each continent: U.S. universities have always been, to some extent, privately or corporately funded, making it easier to understand why many of them embrace the for-profit (or at best nonprofit) high-tech apparatus that renders them part of a global online market. In contrast, European taxpayers have traditionally supported a public system of higher education that is economically distinct from its U.S. counterparts. We will examine various European responses to the MOOC phenomenon to understand how and why (national) public systems of higher education struggle with these global (commercial) ventures.

European and U.S. systems of higher education have become an intricate battleground for waging private, corporate, and public interests in an online economy where technological interoperability is expedited by larger social trends such as commodification, deregulation, and globalization. The intricate knot of corporate and public interests raises important questions. What role will MOOCs play in a market where university brands operate in close connection with high-tech companies competing for scarce talent? What happens when a few major players develop online platforms that control course formats, credits exchange, validation, and proctoring systems, thus creating a global market of “learner’s qualifications?” Even if online courses will never completely replace conventional college education, MOOCs will likely have a substantial impact on definitions of “publicness,” and particularly on the definition of higher education as a *public good*.

Online Education in a Social Media World

The recent incorporation of MOOCs in higher education cannot be understood without taking into account two prerequisites: the ubiquitous presence of social media in all facets of student life and the quick rise of online platforms as instruments of disruptive innovation. Networked sociality has become a precondition for restructuring society’s established infrastructures, whether large industries or entire public sectors. Airbnb and Uber’s unsettling of traditional hospitality industries and transportation businesses can be largely attributed to young customers who are used to organizing much of their social lives via online platforms. So it should come as no surprise that, starting in 2011, institutions for higher education also became the locus of high-tech intervention. Tools facilitating social networking,

microblogging, Web search, voice over IP, instant messaging, and webmail services had already deeply penetrated everyday college life when Google engineer Sebastian Thrun opened up his Stanford computer science class online to all interested outsiders. His course attracted some 160,000 students from all over the world. One month after finishing what became known as a massive open online course, or MOOC, Thrun gathered enough venture capital to start Udacity. Besides Udacity, two major players entered the market: Coursera, a for-profit MOOC venture, started out of Stanford, and was soon followed by Princeton and the University of Michigan. The third player, edX—a consortium headed by MIT and Harvard—distinguishes itself from the other two as a nonprofit platform running on open source software.

One year later, Udacity, Coursera, and edX offered popular platforms for online education that threatened to disrupt conventional college propositions and forced both private and public universities to choose between joining the bandwagon and turning their backs on disruptive innovation. MOOCs soon became the next big thing in Silicon Valley's mission to "make everything social" (Van Dijck, 2013a). The race for a chunk of the global MOOC market is anywhere near settled; in fact, the competition is in full swing with new players entering the market and occupying niches while the three frontrunners announce breakthroughs every couple of months.

The claim that higher education will be the next frontier in disruptive innovation is both unsurprising and peculiar. Unsurprising because it perfectly fits the larger shifts toward networked socialization and innovative disruption of entire sectors; peculiar because online learning tools and educational methods based on Internet environments are anything but new (Boven, 2013; Moore & Kaersle, 2012). Practices of distance learning (d-learning) had long become institutionalized since the 1960s through Open Universities in Europe and through for-profit organizations in the United States. They catered mostly to an underserved student population that did not fit the traditional college crowds, such as older students, part-timers, special needs students, and professionals in need of specific vocational training. In the 1990s, d-learning metamorphosed into e-learning due to the incorporation of different electronically based tools, from Web search to e-mail and audiovisual streams. Since 2008, a number of online courses evolved from the open education ideology under the name of cMOOCs, where *c* stands for *connectivist*; the label indicates these courses' strong preference for a kind of online learning that concentrates on interaction between students and teachers—discursive communities creating knowledge together—that is difficult to format or standardize (e.g., ConnectivistMOOCs, 2015).

Starting in 2012, the tradition of e-learning and emerging cMOOCs was suddenly overshadowed by the success of xMOOCs—courses created by Coursera, edX, and Udacity. xMOOCs are grounded in profoundly different pedagogical assumptions than cMOOCs, because they build on the traditional off-line classroom model of lectures, short quizzes, and testing (Ebben & Murphy, 2014; Yuan & Powell, 2013). Several factors may explain what accounts for xMOOCs' sudden popularity at this particular moment. First, xMOOCs are modeled after the reigning technocommercial logic of major social media platforms. Second, these new platforms find easy entries into public sectors on both sides of the Atlantic, weakened by decades of privatization and globalization. We will return to this second sociocultural development later. In the next section, we argue how xMOOCs are developed as part of a global ecosystem of connective media—a system controlled by a handful of high-tech players (Google, Facebook, Amazon, Apple, Microsoft) that organize and structure the world's online sociality.

The Relation Between Social Media Dynamics and MOOCs

Although the three largest xMOOCs (Udacity, Coursera, and edX) are different in terms of targeted user groups and governance structure, their technoeconomic operating principles are strikingly similar as they are perfectly aligned with the operational logic of social media. We have elsewhere explained some of the principles that govern this logic (Van Dijck & Poell, 2013); for the purpose of this article, we will highlight three elements that are particularly dominant in the organization of xMOOCs: datafication, algorithmic selection, and commodification. We will explore each of these platforms' technoeconomic principles and explain how they inscribe particular ideological and pedagogical perspectives on higher education.

Datafication as a Principle of Learning

Datafication—the tendency to quantify all aspects of social interaction and turn them into code—is one of the basic principles undergirding social media platforms (Mayer-Schoenberger & Cukier, 2013; Van Dijck, 2014). Just as Facebook has coded social acts such as “friending” and “liking” into algorithms, Coursera, edX, and Udacity have invested in coding the social processes of “learning.” A basic assumption underpinning xMOOCs is that students need to “like” what they “learn,” because they learn more if they “like” something. To develop automated systems, economy of scale is essential. Facebook needed large numbers of users to gather aggregate data in order to design self-learning algorithms that recommend friends and to translate millions of likes into personalized content selection. In a similar fashion, xMOOCs need massive numbers to enroll in their courses. Quantitative learning analytics, grounded in large numbers of students' online behavioral data, involve data *tracking* as well as *predictive* analytics. For instance, data tracking mechanisms can be used to register fine-grained information about the amount of time a student needs to solve a problem, to record the cognitive stages in problem solving, to measure the amount of instruction needed, and to trace student interaction (Koedinger, McLaughlin, & Stamper, 2014a).

Proponents of xMOOCs promote the virtues of quantitative learning analytics and claim they are a significant quality booster of higher education. Real-time data about students' individual and collective learning processes help instructors monitor students' progress and allow for corrective feedback. *Personalized* data allegedly provide unprecedented insights into how individual students learn and what kind of tutoring they need. And aggregated data about learning behavior provides the input for individual “adaptive learning” schemes. As xMOOCs advocates argue, measuring participation levels may improve the quality of instruction (Maull, Godsiff, & Mulligan, 2014). Because tastes vary among individual students, it is essential to adapt each unit to personalized preferences and talents. Learning algorithms replace an instructor's assessment of students' needs; if the data show that some students are better at solving verbal math problems than abstract equations, MOOC developers can adapt the assignments and implement personalized variations.

Detractors of xMOOC platforms have pointed out how the principle of datafication advances a pedagogical perspective also known as “learnification,” focusing on *learning* rather than education, and on

processes rather than on teachers or students. The online learning process in xMOOCs is modeled after conventional mass instruction—lecturing to large crowds—and testing. By bringing this process online, the (social) activity of learning is broken into quantifiable cognitive and pedagogical units, such as a lecturer's instruction, short quizzes, assignments, deliberation with other students, and tests. Underlying the xMOOC strategy is a focus on the real-time, short-term process of learning rather than its long-term outcome, which is, in most college situations, to provide an *education*. Education, as critics argue, is not simply the sum of separate units of teaching, but involves simultaneous nourishing of intellectual, social, technical, and cognitive skills. The "learnification" of education, according to some social scientists and philosophers, sprouts from the idea that learning can be managed, monitored, controlled, and ultimately modified in each student's personal mind (Attick, 2013; Biesta, 2012; Mead, 2014).

Datafication as manifested in MOOCs appears to be a double-edged sword. Ideally, personalized assignments based on quantitative measurements help improve each individual's learning process and outcomes. However, personalization algorithms are based on *inference* of users' needs or interests—supporting the prediction of needs rather than providing remedial teaching. A by-product of personalized learning algorithms may be that they "filter out what is not designated as being of interest to users and rather presents to them only what fits the system's belief of what their interests are" (Ashman et al., 2014, p. 824). In addition, the biggest challenge that MOOC developers face is the rather paradoxical demand of *mass individualization*: with thousands of students enrolled in a course, how do you personalize feedback—known to be the costliest factor of higher education? Automated (multiple choice) tests are much more manageable than writing assignments in the economies of scale that xMOOCs produce. So it is no surprise that certain types of learning and testing—those relying on easy-to-process assignments and feedback—are preferred over others. Predictive algorithms and adaptive feedback mechanisms, according to McKay (2013), are hardwired into a MOOC's track; they are aimed at recording every click of the mouse in the datafied process called "learning."

The ideology of datafication and learnification inscribed in the technology of xMOOCs contrasts the curriculum-based approach that most (public) institutions for higher education adhere to. Coursera, Udacity, and edX are steeped in the perception of higher education as manageable data-based processes; each unit of this process can be separately quantified and commoditized, allowing for customized services—a principle to which we return later. Lecturers who perform on screen are distinct from instructors who are handling the (automated) feedback or examinations, and the engineers tweaking algorithms may not be involved at all in teaching the class. Filmed lectures fit YouTube video formats, typically featuring sequences no longer than 12 minutes. Course development and labor-intensive feedback are left to instructors employed by the colleges who partner with an xMOOC platform. Platforms like Coursera prefer uniform course formats that fit their interface; they make the learning process manageable by developing standardized technological solutions for mark-up and feedback. The front end and back end of the interface invisibly impose a specific model of learning upon all participating students who function as data-providers feeding the system.

With regard to datafication, it is also interesting to note how Coursera and edX view the function of research in relation to teaching. Using the classroom as a field of experiment is an old tradition in education sciences and psychology. MOOCs capitalize on their ability to involve students in a lecturer's

own research—for instance, when a professor of international law requests all students to crowdsource material from various countries for a comparative study. On the downside, some MOOCs are coded to make these experiments continuous and pervasive. edX developers regard the online classroom as one big research experiment whose larger aim is to study how people process, retain, and forget information. As edX's chief scientists, Piotr Mitros, commented in an interview in the *Chronicle of Higher Education*, "everything a student does is logged and can be mined by researchers" (in Parry, 2012, para. 26). Students enrolled in edX courses are (unwitting) participants in continuous lab experiments as they are subject to constant monitoring. For instance, researchers can show content to one group of students and not to another and then compare the results. Over the past years, MOOC-related research has shown a conclusive shift toward continuous behavioral experiments (Ebben & Murphy, 2014).

Again, the similarities with Facebook are striking. In June 2014, researchers revealed they had studied the phenomenon of online "emotional contagion" by manipulating the News Feed stream of 650,000 Facebook users. The controversial study prompted academic researchers to ask questions about the ethical implications of massive online experiments involving uninformed users (Harriman & Patel, 2014; Kramera, Guillory, & Hancock, 2014). Using students for research experiments is nothing new. However, the use of behavioral data of massive numbers of unwitting participants raises important ethical questions; issues of privacy and repurposing of data are a virtually unregulated territory (Ashman et al., 2014).

Algorithmic Selection and Reputational Rankings

Datafication and predictive analytics are intricately intertwined with another key social media mechanism at work in xMOOCs: the use of algorithmic selection and reputation systems that affects the dynamic between teachers, students, and institutions. In conventional classroom settings, teachers assess student performance and translate their findings into grades; students, for their part, evaluate an instructor's teaching performance at the end of a course, providing input for improvement to be used in subsequent courses. The educational value of teachers' and students' mutual assessments has been a topic of much scholarly reflection (Astin & Lising Antonio, 2012). Over the past decades, student and teacher qualifications in higher education increasingly have been measured in terms of *reputation* and *resources*. Students' relative peer ranking on the basis of their grade point averages has become the essence of quality measurement. Institutions themselves are comparatively ranked—often based on the wealth of their resources, including faculty and number of books in the library. As Astin and Lising Antonio (2012) argue, the problem with this mechanism is that reputation and resources are now seen as ends in themselves rather than as means toward fulfilling the societal missions of education and research.

The ecosystem of social media is fundamentally grounded in the algorithmic principles of selection and reputational ranking. On most social networking sites, assessments happen *instantly* and *continuously*, mostly on the basis of *perception* or *likability*. Sites such as Facebook, Uber, and Airbnb deploy user recommendations to anchor reputation and trustworthiness: Customers review their drivers or hosts, who, in turn, can check their customers' online reputations. In global online environments with large numbers of anonymous users, reputational rankings appear to be pillars of mutual trust. Five stars promise trustworthiness and good standing—rankings largely based on customers' *perceptions* of services.

If many people “like” a restaurant, then more people want to eat there.

But what happens when we transfer this principle to an online learning environment? And how does it affect the traditional (hierarchical) dynamics between teacher, students, and institution? Popularity rankings and relative assessment mechanisms based on peer reviews are at the heart of most xMOOCs. As Jacovella (2013) argues, the “students’ community is both testimonial of course quality and entrusted with the role of evaluating students’ performance through homework assessment and references” (p. 1300). xMOOC environments use evaluative tools typically deployed by social media platforms: Students like and recommend courses and teachers to other students as if they were YouTube clips. In off-line academic curricula, evaluations of students’ performance and students’ satisfaction with an instructor’s teaching commonly happen after the course is finished and before grades are in in order to prevent a teacher’s grades from being influenced by students’ evaluations and vice versa. In an xMOOC, student and teacher performance may be *continuously monitored* on a dashboard, and assessments are based on behavioral tracking mechanisms and automated classroom surveys—techniques already introduced in elementary schools throughout the United States. Buttons that commonly measure customer satisfaction are increasingly utilized to quantify teachers’ performance and students’ educational experience.

However, educating is a process very different from liking. Indeed, learning metrics may provide valuable insights into students’ and teachers’ real-time performance, but education is a long-term investment, requiring assessments based on qualitative interaction rather than quantified perception. Students do not always like what they learn; learning often requires endless practice or painful failing—negative incidents that only much later turn out to be valuable experiences. The instantaneity of recommendations and likability of perceptions—the need for instant gratification—may be squarely at odds with the kind of dynamic involved in academic education: Tough teachers may turn out to be the best educators, even if they are not much liked. And popular lectures or entertaining performers do not always enhance academic knowledge. Algorithmic learning is grounded in the assumption that learning and liking are similarly quantifiable processes. Catering too much toward students’ individual preferences or instant needs can eventually render students less tolerant toward various teaching styles. If education is regarded as a holistic, curriculum-based experience rather than a chopped-up process of self-contained units of processed learning data, there will likely be less emphasis on uniform standards and outcomes.

Until now, the effects of algorithmic systems on students’ individual learning outcomes and teachers’ performance have been poorly tested in the context of xMOOCs, so their efficacy remains questionable (Coetzee, Fox Marti, Hearst, & Hartmann, 2014). Also unresolved are the ethical issues involved in the ownership of (meta)data and their accessibility, which can be quite thorny. One of the advantages claimed by xMOOCs is that students’ performance is not just assessed in terms of grades or learning outcomes but can be evaluated in terms of learning curves and social adaptability. Datafication of the learning process enables dashboards for minutely monitoring interactive and cognitive behavior that yield an abundance of data beyond mere test results. How fast do students answer a quiz question? How autonomous or collegial are they when it comes to problem solving? Behavioral data are a sort of by-product of continuous monitoring, and students are barely aware of these data being accumulated, interpreted, and repurposed (Ashman et al., 2014). In fact, dashboards yield behavioral information that future employers may find far more interesting than a straightforward grade point average. It is now

completely normal for employers to scrutinize a potential employee's postings on Facebook and LinkedIn and reject candidates on the basis of social media appearances (Swallow, 2012; Van Dijck, 2013b). Therefore, the normative push to assess a student's entire datafied performance record by employers is not at all imaginative.

Commodification and Business Models

Besides datafication and algorithmic selection, a third technocommercial principle underpinning the organization of MOOCs is the principle of commodification: the transformation of objects, activities, and ideas into tradable commodities. According to its proponents, xMOOCs are not just recommendable vehicles for online *learning*, but they promise to become suitable replacements of college *education*, turning them into public goods. The three leading U.S. MOOC ventures initiated and developed by private universities (Harvard, MIT, Stanford, Princeton, and the University of Pennsylvania) are all ranked in the top 10 of educational institutions. MOOC ventures select their U.S. and non-U.S. partners on the basis of reputation and world ranking—a system that is partially the outcome of strategic reputation management (O'Loughlin, MacPhail, & Msetfi, 2013). At first sight, Coursera and edX seem to have built their platforms on different premises: Whereas Coursera is a start-up backed by venture capitalists and staked in a for-profit model, edX has committed itself to a nonprofit environment running on open source software. Yet despite their contrasting economic foundations, xMOOCs' business propositions are strikingly similar, and they seamlessly fit the dominant socioeconomic principles connecting all platforms on the social Web.

For one thing, platforms tend to sell xMOOCs as a humanitarian mission: The best university courses, free to everyone with online access, will elevate people of all nations and lift them out of poverty. Coursera's self-proclaimed goal is to "empower people to improve their lives, the lives of their families and the communities they live in with education" (Coursera, 2014). edX closely collaborates with Google in a nonprofit alliance named MOOC.org, and their aim is to "open up higher education to students worldwide" (edX, 2014). xMOOC platform owners often dismiss business models as a trivial aspect of their ventures, but they are far from trivial if we look at the entire ecosystem of social media. Similar to Facebook, Google, BuzzFeed, LinkedIn, and Spotify, Coursera and edX have both opted for the "freemium" model. What does this model mean in the context of xMOOCs? First, to optimize their metrics, it is crucial to attract large quantities of students with free content. The more (meta)data they collect, both in terms of breadth and depth, the more collectors learn about users' cognitive abilities (Koedinger, McLaughlin, & Stamper, 2014b). The flip side of massive enrollment is massive dropout: Only 5% to 7% of all registered students actually finish an online course. It could be argued that massive enrollment resulting in high dropout exemplifies the marketing funnel or purchase funnel typical for all online social platforms (Clow, 2013). Mass participation rather than completion is critical to the efficacy of MOOCs if they want to obtain large sets of learning data and student profiles. Students and young professionals are arguably the most coveted target population of many data industries, and their attention is very valuable. Drawing eyeballs is at the core of this emerging business model—as it has been in the development of most social networks.

In line with the freemium model, the premium variant expands the free option by offering extra paid-for services such as certificates of completion, proctored exams, and identity verification. Proctored

exams and verified certificates are gradually developed into—potentially profitable—units that can be marketed globally. The freemium model has proven very successful in online gaming, where large numbers of users are lured to a platform to play free games and are subsequently seduced into in-app purchases without which they stand no chance of winning. Seen in this light, even the notoriously high dropout rate of MOOCs can be turned into an interesting business proposition by selling paid tutoring services to students who lag behind. Still in the early stages of their development, Coursera and edX adhere to the freemium model, but it is not outside the realm of possibility that they will opt for other sources of revenue in the future. In his overview of MOOCs' potential future business models, Yoram Kalman (2014, p. 9) mentions the sale of participant data, advertising, and income from "superstar faculty" giving video lectures. By introducing the freemium model to education, xMOOCs appear able to offer high-quality education for very little money. But what is the economic rationale behind this business model? And how does this value proposition differ from the pricing system that sustains traditional universities?

Over the past few years, the freemium model has caused the disruption of entire sectors such as the publishing, newspaper, and music industries (Dellarocas & Van Alstyne, 2013). So it may come as no surprise that many university administrators, fearing that MOOCs mark the end of brick-and-mortar universities, want to ally with corporate platforms promising educational innovation. Regular universities offer a packaged educational experience—an experience that comes complete with lecture halls, facilities, and libraries and labor-intensive courses where instructors give feedback and for which they proctor and grade exams to result in a diploma degree (in some instances, course certificates and transfer credits). For this all-inclusive package, students pay tuition and fees; in the case of public education, taxpayers fund the institutions to make higher education more affordable to citizens. The conventional business model reflects the ideology of higher education as a curriculum-based, comprehensive experience that best caters to students of a certain age group and that nurtures a collective academic standard. Open universities or colleges that specialize in intensive distance learning typically offer online education to "nontypical" students (part-time, older, working adults) at a price that includes not only lectures or course content but certification, advising, tutoring, and testing.

xMOOCs offer a proposition in line with social platforms such as Facebook: Content is free, and money is made from selling data, offering premium services, and leveraging connective value to interested third parties. Universities consorting with Coursera or edX pay for the development of their course content as well as for instructors processing feedback and questions; producing an xMOOC course indeed requires a substantial investment from partnering universities. As Kalman (2014, pp. 11–12) convincingly argues, the xMOOC logic tends to strip down higher education to its most traditional and visible components—video lectures and examinations—some of which are offered for free. Partnering institutions pay for the costly infrastructure that comes with higher education. Coursera charges a percentage of course revenue—if there is any—in exchange for using its format and global distribution function. So whereas the educational content is entirely generated and paid for by universities, xMOOCs' added value comes from connecting content to students worldwide. Not unlike Uber and Airbnb, Coursera and edX can trade off the valuable information to third parties using student data as currency.

As we learn from the history of social media platforms, business models tend to change quickly and these changes both reflect and construct transformative social norms and values. Looking back on the history of Facebook and Google, it is important to notice how alterations in their business models profoundly redefined the relationship between platforms and users. Facebook users were gradually enticed to accept less privacy and more advertising in exchange for convenient and “free” networking services (van Dijck, 2013a). Business models underpinning xMOOCs will likely affect the relationship between students, teachers, and institutions. xMOOCs tend to impose a stripped-down model of online learning as the new global standard for higher education. Meanwhile, they nudge universities and colleges around the globe into accepting course-based, proctored certificates into their institutional systems. As we have seen in the case of Facebook, it may not be long before MOOCs normalize the implementation of targeted, personalized ads in online educational environments. And what happens if accumulated social (meta)data culled from participants all over the world can be sold to businesses competing for global talent?

The technocommercial principles of datafication, algorithmic selection, and commodification make possible a profound shift in the organization of higher education. Comparing xMOOCs to a more general social media dynamics, we can better understand how the underlying principles, particularly the freemium business model, may disrupt the entire educational sector. xMOOCs promise an easy and quick fix for local and state systems increasingly deprived of public funding; all students can turn to MOOCs that are free of charge. However, the real costs of MOOCs are hardly visible, because they are largely paid for by academic partner institutions and by the new currency of private data. Long-term implications and collective expenses are not accounted for in xMOOCs’ business models. Perhaps unintentionally, the noble goals of corporate online learning sites may ultimately destabilize the larger mission of public education—a mission that promotes values such as openness and equitable access to diploma qualifications, quality education at an affordable price, diversity of students, and a nurturing pedagogical environment for *all* students. To understand how public education is contested by the xMOOC proposition, we will now discuss the response of European universities to U.S. market innovation.

MOOCs and European Systems of Higher Education

The dissemination of xMOOCs, however powerful and disruptive, can never single-handedly account for an institutional transformation of higher education. We need to understand how, over the past decades, larger tendencies such as globalization and privatization weakened public sectors. When Coursera, edX, and Udacity arrived on the scene in 2012, many local or national educational institutions, including some of the United States’ most prestigious *public* university systems (University of California, State University of New York) had already digested serious cutbacks in funding for decades, resulting in higher student fees and higher dependence on private funding. At a time when universities and students are both pressured to find funding, a proposition that seemingly reduces the cost of teaching, attracts large enrollments, and offers free courses to students seems irresistible. So it should come as no surprise that the “free” logic of xMOOCs found inroads in many U.S. universities—private as well as public—that welcomed the opportunity to expand their reach beyond local or national student populations. At the same time, the introduction of xMOOCs drew substantial criticism from faculty working at U.S. colleges, most vocally faculty teaching at San Jose State University—Silicon Valley’s own backyard—who drew attention to xMOOCs’ potential implications for education as a *public good* (Kolowich, 2013; Meister, 2013).

The controversy over MOOCs as a potential threat to public education played out even more intricately in Europe, where online courses provided by U.S. corporations became the battleground for waging public versus private interests in the wake of larger globalization and privatization disputes. European systems of higher education have traditionally been cemented in the conviction that schooling is a public good paid for collectively because it benefits society as a whole. Free education in the European context generally means paid for by taxes. Although tuition-free higher education is still the rule in many European countries, a number of public institutions have started to charge modest fees to recoup at least a small percentage of the expenses of higher education.

The way in which European university systems reacted to the xMOOC phenomenon was diverse, with each institution and country weighing its own interests in the highly competitive global sector that higher education has become (Kopp Ebner, & Dorfer-Novak, 2014). Perhaps surprisingly, xMOOCs triggered instant support from many public university administrations and faculty across Europe. Individual universities chose to connect with various U.S. platforms in their worldwide competition for more and better students. In The Netherlands, for instance, five public universities signed up to partner with edX or Coursera in 2013. The same happened in Germany, where at least 10 universities teamed up with U.S. xMOOC pioneers. Colleges in Denmark, France, and Italy entered negotiations with the U.S. frontrunners. Part of xMOOCs' appeal to European universities is obviously the implied association with top-ranked U.S. institutions and their high-tech partners, which can, in turn, enhance the brand of the university, the reputation of individual professors, and the status of particular disciplines and, of course, attract a global audience of students.

One might have expected that European nations with strong public systems of higher education would be uniquely equipped to launch public alternatives to U.S. xMOOCs. Some countries did: Spain chose to build its own platform (Miriada) in collaboration with private companies, and so did Poland. Most countries did not choose to organize their own MOOC platforms and allowed for market-driven xMOOCs to find their way into the national public systems. The Netherlands is a case in point: All 14 Dutch universities (including the Open University) are publicly funded, and all are ranked fairly high in the international ranking systems. Collectively, they represent a national higher education landscape without peaks but also without any low-ranked universities. The Dutch system is explicitly cemented in public values: It is curriculum based and diploma oriented and enrolls a high percentage of young adults from all socioeconomic strata at a uniformly low tuition rate. Moreover, as part of the national infrastructure, the government subsidizes an organization called SURF, which covers the development and distribution of digital tools for all Dutch universities. With such a strong system in place, one would expect The Netherlands to be ideally equipped to offer a public alternative to xMOOCs. Yet despite this apposite national infrastructure, there was no coordinated effort on behalf of universities or the government to design a Dutch MOOC alternative.

In response to xMOOCs, several *supranational* European counterinitiatives appear notable. Two plans—OpenupEd and the League of European Research Universities (LERU) initiative—draw attention not only because of their emphasis on public educational values but because of their divergent pedagogical ideologies. OpenupEd, which started in 2013, is a concerted effort by 12 partners, including a number of national Open Universities, to usher e-learning and cMOOCs into the rapidly emerging global arena of

online education (Decker, 2014; OpenupEd, 2014). xMOOCs pose both an opportunity and a threat to the Open University philosophy. An opportunity because they promote distance learning itself, and a threat because xMOOCs sharply contrast the connectivist pedagogy of Open Universities specialized in online learning. According to its website, the OpenupEd consortium clearly attempts to reassert European public values in higher education—most explicitly independence, openness, equity, quality, and diversity—separate from their institutional embedding in Open Universities. Apparently, the institutional framework of Open Universities itself no longer justifies these values, evidenced by the fact that not all partner institutions in the OpenupEd alliance are Open Universities in the traditional sense.

A second example of a cross-national European response to the U.S. xMOOC phenomenon is an initiative taken by the League of European Research Universities (2015), a consortium of the 20 highest-ranked public universities. A policy paper aimed at coaching its members to design an adequate response to online mass instruction emphasizes the need to develop a comprehensive strategy toward online learning for research-intensive universities (Mapstone, Buitendijk, & Wiberg, 2014). The paper epitomizes a political balancing act, not in the least because at the moment of publication, in June 2014, half the league's members had already aligned themselves with one of the xMOOCs frontrunners; as individual universities, they want to be associated with the U.S. Ivy League. In an attempt to appeal to their "other" identity as European partners in a *public* alliance, each member university is encouraged to design its own comprehensive approach to online learning, which may include xMOOCs but should not be limited to them. Stressing the public values of quality teaching and the integration of research in the academic curriculum, the paper takes a cautionary stance: Online learning requires considerable extra investments, while its effectiveness—both in terms of pedagogy and finances—is far from proven.

Clearly, the LERU report has to navigate between Scylla and Charybdis: On the one hand, the manifesto for quality online learning carefully manages to distance itself from its European *public* allies—the Open University alliance—which would be detrimental to its members' research reputations. On the other hand, the manifesto sensibly maneuvers the consortium's position vis-à-vis U.S. xMOOCs by identifying some of xMOOCs' gains while simultaneously avoiding the pitfalls of commodification and privatization. The LERU favors the curriculum-based approach to higher education over the model of chopped-up elements of video instruction and proctored tests. Although user data are extremely valuable for pedagogical research on adaptive learning, they should not be used to commercialize any parts of the learning process. And instead of supporting a freemium model, the paper stresses that online educational content is very costly to institutions; to pay for these investments, the league recommends exploring "public and philanthropic opportunities for supporting online learning" (Mapstone et al., 2014, p. 22).

In sum, the LERU proposition exposes both the strengths and weaknesses of a European public counterinitiative to U.S. MOOCs. Addressing the solidarity between European public partners against a global commercial ideology—a force that can be countered only on a supranational level—is reminiscent of the European Community's efforts to curb Google's and Facebook's incursions on each member state's public turf. But each transnational attack on the expansion of a globally imputed social media dynamics creeping into the fibers of national public systems also exposes the inherent weakness of European counterattacks: They seem more like defensive responses than offensive public alternatives. As such, the

LERU paper can be viewed as a site of contestation where alternative definitions of publicness are launched and tested.

xMOOCs and the Reinvention of Publicness

The European responses to U.S. xMOOCs illustrate an attempt to preserve public educational values in the face of an emerging global system of online learning—a system defined by the technoeconomic principles of social media. Few people believe xMOOCs pose a real threat to the brick-and-mortar institutions of higher education, explicitly the highest-ranked research universities. But even if xMOOCs do not directly overturn European and U.S. institutional strongholds, will they uproot the public foundations of the educational sector? Such a prospect becomes more realistic if we look at how other (public or private) sectors have recently been unsettled by the transformative powers of global network corporations. Just as the arrivals of Uber and Airbnb have disrupted the transportation and hospitality sectors, edX, Coursera, and Udacity threaten to uproot the higher education sector. Although it is impossible to predict how deeply social media mechanisms will penetrate the traditional structures of higher education, three potential consequences follow from the analysis above: (1) xMOOCs will advance the learnification of higher education, because students expect their online educational environments to blend in with their online social experience; (2) xMOOCs will increase pressure on universities to form a global market of educational standards and credit exchanges; and (3) the xMOOC phenomenon will advance global tendencies toward the denationalization and commercialization of public education.

To start with the first potential implication: If universities want to attract students, their infrastructures need to blend in with their students' everyday online social environments. xMOOCs' natural habitat is a fully incorporated ecosystem of platforms—a system that is firmly based on the technoeconomic principles (datafication, algorithmic selection, and commodification) that govern the ecosystem of social media (Tess, 2013). As we have seen over the past decade, this ecosystem leaves little space for initiatives that are not developed in close alliance with high-tech companies dominating its laws of interoperability. Public counterinitiatives are unlikely to succeed for the same reasons that Europe has failed to develop a public search engine that can compete with Google's. With a penetration rate of 90% of the European search market, the Silicon Valley giant is almost impossible to avoid, particularly in the educational segment. Over the past 10 years, Google has built a formidable presence in information and communication services of universities—a tendency also known as the "googlization" of education (Vaidhyanathan, 2011). Google promotes frictionless sharing by offering free services such as Gmail, Scholar, Books, and LibraryLink to students, teachers, and universities. For funding-deprived institutions, these propositions are increasingly hard to resist, and the result is that corporate platforms such as Google, Facebook, LinkedIn, and Microsoft are able to position themselves at strategic gateways of educational infrastructures—libraries, online systems and administrative and communication systems. Students, for their part, expect institutions to offer them the same quality and convenience of online tools that they can access for "free" in the commercially operated infrastructure, where data are the new currency.

The xMOOC proposition is so compelling because it fits the political and economic logic of the dominant ecosystem: learning (like friending, liking, sharing, and trending) will become the next verb

undergoing a metamorphosis by design. The culture of connectivity—embedded most profoundly in buttons hardwired for instant gratification—does not stop at the school walls. It would be naïve to believe that teenagers born and raised in a “like economy” will leave the territory of education untouched (Gerlitz & Helmond, 2013). There is nothing wrong with disruption per se; what deserves more scrutiny, though, are the pedagogical implications of an online system that is predicated on commercial mechanisms. Indeed, online learning tools can add valuable and extremely beneficial tools to the arsenals of teachers and researchers (Gikas & Grant, 2013; Rennie & Morrison, 2013). These tools, if carefully mixed with proven pedagogical methods in blended learning environments, may enhance the learning process not only for the already advantaged students but for those who are less gifted and need more training. But schooling, on all levels, has always been and will always be a labor-intensive, local, and costly affair. The compelling rhetoric used by Coursera’s and edX’s promoters makes xMOOCs appear as “technological solutionism” to the problem of disadvantaged students all over the world (Morozov, 2013). And yet, MOOCs are more than a story of technology, as they are part of the powerful socioeconomic conditions in which higher education is embedded (Stohl, 2012).

The second potential consequence regards the pressure on universities to adopt a world market of transferable credit value and educational standards set by xMOOCs. Higher education is likely to be prone to disruptive innovation, but it is a sector fundamentally different from the hospitality and transportation industries. Educational value is still grounded in nationally organized systems of accreditation, standardized credits, and valorized diplomas. In most European countries, accreditation systems are regulated and validated by government institutions, independent from universities, and are subject to *democratic control*. The pressure to open up these accreditation and standardization systems to commercial players is an important strategy pursued by xMOOCs: As we have seen, Coursera wants to establish certification services just as Facebook wants to become the world’s online identity service. Once commercial players control the gateways to online education in a global system, there is no way around them—just as in the case of Google Search. The sovereignty of European governments in setting educational standards is crucial when it comes to regulating online educational platforms. As we have seen in the case of Airbnb and Uber, their business model depends on disrupting national and state regulations, and higher courts currently settle numerous cases.

European reactions to U.S. xMOOCs may be an understandable defense mechanism to save a public sector—a sector that already has suffered the effects of decades of privatization and decreased tax funding. Economic downturns have driven quality universities (both public and private) to fend for themselves. European public universities are understandably torn between teaming up with U.S. Ivy Leagues and collectively pushing a viable public alternative, prompting existential questions about their *public missions*. However, it is the lower-ranked universities that are traditionally focused on the less wealthy and more labor-intensive segments of the student population that may be much more vulnerable to the effects of xMOOCs; after all, students from lower income brackets tend to be lured toward “free” professional and customized training (Newfield, 2011). Solidarity between higher- and lower-ranked (public) universities is increasingly complicated due to global pressures on national collective systems. The lure to become incorporated in a global circle of top-ranked universities seems much stronger than the willfulness of national and supranational forces to protect public education across the board. As a result,

local and state-funded colleges that have already been deprived of public funds may suffer more public neglect in the future.

Are U.S. xMOOCs poised to become the dominant platforms for higher education? Will they set global standards for online testing and certification? And will a few high-tech companies subsequently manage to control the gateways to enter these global markets for online learning? As we have argued in this article, institutions for higher education are struggling to find an appropriate response to xMOOCs, particularly its technocommercial principles. Big educational brands like Stanford, Harvard, and MIT are intricately intertwined with corporate platforms such as Coursera, Udacity, and edX, which are in turn closely allied with the big high-tech players Google, Facebook, and Microsoft. The only way to avoid missing out on an opportunity seems to cooperate with xMOOC platforms, even if cooperation typically means co-optation. As Dominique Boullier (2012) concludes, the xMOOC model is "more about predation than cooperation, more about reproduction than innovation, more about standardization than diversification" (para. 10).

From a European perspective, xMOOCs are an ideological battleground where a revamped definition of what public education means in a networked world is wagered and contested. The definition of *publicness* is as much about technological and economic principles as it is about pedagogy, effective learning strategies, and quality teaching (Beetham & Sharpe, 2013). Even if online mass instruction will never replace traditional college education, xMOOCs will likely have a substantial impact on how education is defined as a public good. Just as Google, Apple, Uber, Facebook, and many other corporate actors of the global network economy are challenged by national and transnational regulators to comply with European values concerning privacy, antitrust, and taxes, the fight over the meaning of publicness takes place in a number of different spaces. Higher education is one of the sectors where this struggle takes place; governments and university administrators will inevitably need to address the regulatory problems at stake here, once they acknowledge the potential profound ideological shifts in the emerging global market for online learning.

References

- Ashman, H., Brailsford, H., Cristea, A. J., Sheng, Q. Z., Stewart, C., Toms, E. G., & Wade, V. (2014). The ethical and social implications of personalization technologies for e-learning. *Information and Management*, 51, 819–832.
- Astin, A. W., & Lising Antonio, A. (2012). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. Plymouth, UK: Rowman and Littlefield.
- Attick, D. (2013). Education is dead: A requiem. I. *Critical Questions in Education*, 5(1), 1–9.
- Beetham, H., & Sharpe, R. (Eds.). (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning*. New York, NY: Routledge.

- Biesta, G. (2012). Giving teaching back to education: Responding to the disappearance of the teacher. *Phenomenology and Practice*, 6(2), 35–49.
- Boullier, D. (2012, December 18). The MOOCs fad and bubble: Please tell us another story. *Inside Higher Ed*. Retrieved from <https://www.insidehighered.com/blogs/globalhighered/moocs-fad-and-bubble-please-tell-us-another-story>
- Boven, D. T. (2013). The next game changer: The historical antecedents of the MOOC movement in education. *eLearning Papers*, 33. Brussels, Belgium: European Commission, Open Education Europa.
- Clow, D. (2013). MOOCs and the funnel of participation. In *Proceedings of the Third International Conference on Learning Analytics and Knowledge* (pp. 185–189). New York, NY: ACM.
- Coetzee, D., Fox Marti, A., Hearst, A., & Hartmann, B. (2014). Should your MOOC forum use a reputation system? In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work and Social Computing* (pp. 1176–1187). New York, NY: ACM.
- ConnectivistMOOCs. (2015). Retrieved from <http://www.connectivistmoocs.org/>
- Coursera. (2014). Home page. Retrieved from <https://www.coursera.org/>
- Decker, G. (2014). MOOCology 1.0. In S. D. Krause & C. L. Lowe (Eds.), *Invasion of the MOOCs: Promises and perils of the new massive open online courses* (pp. 3–13). Anderson, SC: Parlor Press.
- Dellarocas, C., & Van Alstyne, M. (2013). Money models for MOOCs. *Communications of the ACM*, 56, 25–28.
- Ebben M., & Murphy J. S. (2014). Unpacking MOOC scholarly discourse: A review of nascent MOOC scholarship. *Learning, Media and Technology*, 39(3), 328–345.
- edX. (2014). Home page. Retrieved from <https://www.edx.org/>
- Gerlitz, C., & Helmond, A. (2013). The like-economy: Social buttons and the data-intensive social Web. *New Media and Society* [online first]. Retrieved from <http://nms.sagepub.com/content/early/2013/02/03/1461444812472322.full.pdf+html>
- Gikas, J., & Grant, M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones and social media. *The Internet and Higher Education*, 19, 18–26.
- Harriman, S., & Patel J. (2014). The ethics and editorial challenges of Internet-based research. *BMC Medicine*, 12, 124.

- Jacovella, L. (2013) Another brick in the wall. The Building of a global university in a time of MOOCs. In *Proceedings of ICERI2013 Conference, Seville, Spain* (pp. 1296–1303). November 18–20, 2013. Retrieved from http://www.academia.edu/5172242/Another_Brick_in_the_Wall._The_building_of_a_Global_University_in_a_time_of_MOOCs
- Kalman, Y. (2014). A race to the bottom: MOOCs and higher education business models. *Open Learning*, 29(1), 5–14.
- Koedinger, K. R., McLaughlin, E. A., & Stamper, J. C. (2014a). MOOCs and technology to advance learning and learning research: Data-driven learner modeling to understand and improve online learning. *Ubiquity*, 3, 1–13.
- Koedinger, K. R., McLaughlin, E. A., & Stamper, J. C. (2014b). Ubiquity symposium: MOOCs and technology to advance learning and learning research: Data-driven learner modeling to understand and improve online learning. *ACM Symposium Proceedings*, 1–13.
- Kolowich, S. (2013, May 19). As MOOC debate simmers at San Jose State, American U. calls a halt. *Chronicle of Higher Education*. Retrieved from <http://chronicle.com/article/As-MOOC-Debate-Simmers-at-San/139147/>
- Kopp, M., Ebner, M., & Dorfer-Novak, A. (2014). Introducing MOOCs to Austrian universities. Is it worth it to accept the challenge? *International Journal for Innovation and Quality in Learning*, 2(3), 46–52.
- Kramera, A. D., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences*, 111(24), 8788–8790.
- League of European Research Universities. (2015). Home page. Retrieved from <http://www.leru.org/index.php/public/home/>
- Mapstone, S., Buitendijk, S., & Wiberg, E. (2014, June). *Online learning at research-intensive universities*. League of European Research Universities, Policy paper No. 16. Leuven, Belgium: League of European Research Universities. Retrieved from http://www.ub.edu/farmacia/recerca/LERU/LERU_AP16__Online_Learning_at_RIUs_final%5B1%5D.pdf
- Maul, R., Godsiff, P., & Mulligan, C. E. (2014). *The impact of datafication on service systems*. Proceedings 47th Hawaii International Conference on System Science. Waikoloba, Hawaii (pp. 1139–1201). January 6–9, 2014. New York: IEEE Computer Society. Retrieved from <http://www.computer.org/csdl/proceedings/hicss/2014/2504/00/2504b193-abs.html>

- Mayer-Schoenberger, V., & Cukier, K. (2013). *Big data. A revolution that will transform how we live, work, and think*. London, UK: John Murray Publishers
- McKay, R. F. (2013, April 11). Learning analytics at Stanford takes a leap forward with MOOCs. *Stanford Online*. Retrieved from <http://news.stanford.edu/news/2013/april/online-learning-analytics-041113.html>
- Mead, K. (2014). The hidden costs of MOOCs. In D. Krause & C. D. Lowe (Eds.), *Invasion of the MOOCs: The promises and perils of massive open online courses* (pp. 45–55). Anderson, SC: Parlor Press.
- Meister, B. (2013). *Can venture capital deliver on the promise of a public university?* Davis, CA: Council of UC Faculty Associations. Retrieved from http://cucfa.org/news/2013_may10.php
- Moore, M. G., & Kearsle, G. (2012). *Distance education: A systems view of online learning*. Belmont, CA: Cengage Learning.
- Morozov, E. (2013). *To save everything click here: The folly of technological solutionism*. New York, NY: Public Affairs.
- Newfield, C (2011). *Unmaking the public university: The forty-year assault on the middle class*. Cambridge, MA: Harvard University Press.
- O'Loughlin, D., MacPhail A., & Msetfi R. (2013). The rhetoric and reality of research reputation: "Fur coat and no knickers." *Studies in Higher Education*, 40(5). Retrieved from http://www.tandfonline.com/doi/abs/10.1080/03075079.2013.842224#.VEN_qSh7
- OpenupEd. (2014). Home page. Retrieved from <http://www.openuped.eu/>
- Parry, M. (2012, October 1). 5 ways that edX could change education. *Chronicle of Higher Education*. Retrieved from <http://chronicle.com/article/5-Ways-That-edX-Could-Change/134672/>
- Rennie, F., & Morrison, T. M. (2013). *E-learning and social networking handbook: Resources for higher education*. New York, NY: Routledge.
- Stohl, C. (2014). Crowds, clouds, and community. *Journal of Communication*, 64(1), 1–19.
- Swallow, E. (2011, October 23). How recruiters use social networks to screen candidates. *Mashable*. Retrieved from <http://mashable.com/2011/10/23/how-recruiters-use-social-networks-to-screen-candidates-infographic/>
- Tess, P. A. (2013). The role of social media in higher education classes (real and virtual): A literature review. *Computers in Human Behavior*, 29(5), A60–A68.

- Vaidhyathan, S. (2011). *The Googlization of everything (and why we should worry)*. Berkeley, CA: University of California Press.
- van Dijck, J. (2013a). *The culture of connectivity: A critical history of social media*. New York, NY: Oxford University Press.
- van Dijck, J. (2013b). "You have one identity": Performing the self on Facebook and LinkedIn. *Media, Culture and Society*, 35(2), 199–215.
- van Dijck, J. (2014). Datafiction, dataism and dataveillance: Big data between scientific paradigm and secular belief. *Surveillance and Society*, 12(2), 197–208.
- van Dijck, J., & Poell, T. (2013). Understanding social media logic. *Media and Communication*, 1(1), 2–14. Retrieved from <http://www.libreloph.com/mediaandcommunication/article/view/MaC-1.1.2>
- Yuan, L., & Powell, S. (2013, March). *MOOCs and open education: Implications for higher education*. Centre for Educational Technology, Interoperability and Standards. Retrieved from <http://publications.cetis.org.uk/2013/667>