

protocols etc. Participants linked their own servers, websites, weblogs, wikis etc. into the network. These MOOCs resembled moderated workshops with many participants and many groups.

Simone Haug and Joachim Wedekind (2013) characterized this type of MOOC, listed many implementations/offers and described some of them in more detail. They discussed George Siemens' idea of connectivist learning and refuted its methodological status of a learning theory (see also Jardin & Gaisch, 2014). Instead, they characterized connectivist learning as a "concept of participatory learning organization", since "learning" is not defined by the environment where learning takes place but by cognitive processes, intellectual growth, the dialectic of concept creation (Jean Piaget), formal thinking and skepticism. These operations and processes always employ the same mechanisms, independent from the environment in which they take place. "Learning theory" is defined by learning, and not by the fact that the learning process may occur in a secluded room while reading a book, or at the university in a seminar, or in a virtual community on the Internet, which is generating information, data, argumentative discourse, and other resources used for debating. In such MOOCs, discourse replaces the content.

In 2011 and 2012, the enormous number of 160.000 interested learners enrolled in the first MOOCs of Sebastian Thrun offered by the company Udacity. In the following months, the companies Coursera and edX started their courses. At this time, in the media the term MOOC changed to denote these mass courses, which provide structures similar to classical courses or classes offered over the Internet. Such mass courses feature a (visible or invisible) lecturer, a lecture section consisting of several short video segments, an assessment section with tests on the lecture content, and a website with forums for exchange among the participants. Unlike the early connectivist MOOCs, in the latter MOOCs instruction focuses on content and follows a curriculum.

Since then, MOOCs offering mass courses have become a mass phenomenon. Up to 400.000 enrollments for a MOOC have been reported. More than 100.000 enrollments are reported more frequently, the mean being above 50.000 enrollments. Since then two types of MOOCs are distinguished: MOOCs with a participatory learning organization called cMOOCs (c from connectivism), and instructional mass courses denoted as xMOOCs (x coming from HarvardX and MITx). xMOOCs aim at presenting and communicating knowledge from degree programs in small units. It is this type of MOOC that became a mass phenomenon, which initially let some students, researchers and journalists assume that xMOOCs would threaten and outdistance today's tertiary educational systems.

Different aspects of xMOOCs can be discussed:

1. Development of xMOOCs, which underwent enormous changes during their first two years of existence (e.g. Schulmeister, 2013);
2. Position of xMOOCs in the educational system to explain why MOOCs do not find a place in the educational system resp. why only little demand from the tertiary educational system is contributing to the sustainability of MOOCs. The initially often heard thesis that xMOOCs would have an disruptive impact on university education, which would lead to substitution of existing teaching, seems to become less prominent.

3. Effective business models: driven by the lack of demand from the higher education sector MOOC providers search for business models in the area of continued education.
4. xMOOCs as a method or didactical model, to examine differences and flexibility. xMOOCs demonstrate a large variety at the surface, seemingly implying a flexible method of instruction. However, the combination of online-mode with free and open access restricts the didactical potential to a spectrum in between behavioral components, Robert Gagné's „Events of Instruction“ and David Merrill's instructionalism (Schulmeister, 1996, 2007). What remains are conveying of information and non-interactive instruction, similar to classical distance teaching.
5. xMOOCs as learning material, to study the use of xMOOCs as a replacement of digital textbooks, which play an important role in the USA, or as lecture videos in combination with a flipped classroom. However, the integration of an xMOOC in your own teaching is not trivial, requires some effort (Griffiths, Chingos, Mulhern & Spies, 2014), and leads to additional cost due to license fees (e.g., see terms of use of Coursera: <https://www.coursera.org/about/terms>).

In this article, mainly the role of xMOOCs in educational systems (no. 2 above) is discussed. The other aspects are only discussed in a cursory fashion.

xMOOCs: The beginning and the turn to continued education

The first xMOOCs and the first companies offering them started with high expectations. Sebastian Thrun, the founder of Udacity, expressed his intentions connected to MOOCs as an attempt to fundamentally change the US tertiary educational system. Initially, on his website he opposed education for just the one percent of top students, and disapproved tenth of thousands of tuition fees. He aimed at democratization of education; education should be free (Welt Online, 29.04.2012). His euphoria was accompanied by a radical vision: in 50 years, the US tertiary education will perhaps know just ten distinguished institutions. (Frankfurter Allgemeine Zeitung, Blog Netzwirtschaft, 7.06.2013). Internet applications and the WWW caused such extreme phantasies and predictions of users because of the enormous speed of acceptance of these innovations by the mass of users.

Two years later, Sebastian Thrun sounds very different. He was the first and so far only of the three pilot MOOC providers who apparently recognized the inherent structures of the educational system and found out more about the learning of students. On the one hand, the idea of a MOOC was obviously too simple: „I was realizing, we don't educate people as others wished, or as I wished. We have a lousy product.“ [1] On the other hand, learners did not behave as expected: „A medium where only self-motivated, Web-savvy people sign up, and the success rate is 10 percent, doesn't strike me quite yet as a solution to the problems of higher education“ (The Chronicle of Higher Education, 8.8.2013). Yet the assumption is still wrong: It is not the self-determined and IT-experienced learner, who gets along with the didactic of MOOCs (Schulmeister, 2013, p. 30-37), but learners, who prefer guided learning, predetermined goals, well-specified tasks, and feedback on their learning. Thus, these are learners, who are extrinsically motivated and behave less autonomous. In comparison, self-determined learners like Thrun prefer self-defined goals, work on self-selected projects, and dislike predetermination and instructionalistic learning environments.

Thrun's current concept is of a different character: „At the very beginning you do a Google Hangout and someone from Udacity talks to you. It's our internal fleet of mentors [who provide coaching through the class]. When we make a class, we have a very different model from a classic MOOC. The team trains mentors specifically for the one class.“ (Deamicis, 2014) This model of continued education resembles a parting from MOOCs. This is why the headline of the interview with Thrun reads: “Godfather of MOOCs' Sebastian Thrun after he disavowed his godchild“.

Daphne Koller, co-founder of Coursera, presented in her TED speech in June 2012 in Edinburgh (http://www.ted.com/talks/daphne_koller_what_we_re_learning_from_online_education) the emotional story of an overcrowded enrollment at a university in South Africa, which led to a stampede that killed a mother. This story should serve as a motivation of her goals: education for all, especially for those who could otherwise not afford it, is the great humanistic tenor of her speech. She described her approach as: „So we formed Coursera, whose goal is to take the best courses from the best instructors at the best universities and provide it to everyone around the world for free.“ Great dreams accompanied her while claiming this: „And finally, this would enable a wave of innovation, because amazing talent can be found anywhere. Maybe the next Albert Einstein or the next Steve Jobs is somewhere living in a remote village in Africa. And if we could offer that person an education they would be able to come up with the next big idea and make the world a better place for all of us.“ Koller wanted to reach these goals by high scaling, to lower the cost per student: „What we're doing is one instructor, 50,000 students. This is the way to bend the cost curves.“ [2]

Just two years later at the World Economic Forum in Davos (January 2014; <http://www.youtube.com/watch?v=d4y5QDxts28> ; beginning at 11:02), Koller defined her goal completely different. When questioned about her experiences with offering people an education who cannot afford it, she answered: „The truth is, our current audience are absolute people who did go for it (i.e., who already have a university education) whether at an institution like Stanford or at institutions elsewhere. And they are discovering later in life, many of them, including the ones who went to Stanford, what they learnt fifteen years ago is not longer enough to keep them relevant and up-to-date relative to the job skills that they need. And so, what we're really providing currently is not a substitute for traditional college experience but rather a way for people to keep themselves refreshed and re-skilled as the world around us is changing faster and faster than ever.“ (Transcript of the author) Thus, also Coursera recognized that their courses do not contribute to Higher Education but are rather continued education. Koller cannot overlook anymore that entering the tertiary educational system failed, and that the majority of MOOC participants is interested in continued education. The new CEO of Coursera, Richard C. Levin, who served 20 years as president of Yale University, defines the „labor market around the world“ as primary target audience of Coursera and does not see „online education as a substitute for what goes on in classrooms or as a cost reducer“ (Interview of Max Nisen, Quartz, 27.03.2014; <http://qz.com/192603/new-coursera-ceo-richard-levin/>).

In both cases, the comparison of initial and current goals emphasizes the shift from a disruptive innovation of the tertiary educational system (Kelly, 2014, p. 2) to continued education in the vocational sector. In view of this change, other questions should be asked: If xMOOCs are not leading to disruptive innovation of higher education, could xMOOCs instead be integrated into the tertiary educational system? Or do xMOOCs become an obsolescent model? Will xMOOCs change from open education to continued education

with costs? In retrospective, one thing is obvious: „it seems clear that MOOCs are neither the cataclysmic disruptor that advocates predicted nor the flash in the pan their critics were hoping for.“ (Kelly, 2014, p. 35) The question whether xMOOCs can be integrated into the tertiary educational system will be discussed in this article. Naturally, the aspects of learning and didactic cannot be ignored. But we will begin with some remarks on the historical forerunners of mass education on the WWW.

Forerunners of mass education on the World Wide Web

Forerunners of xMOOCs include among others educational radio and TV, and school's broadcast (see also Lehmann, 2013). Upon the invention of radio and TV, scientists and media representatives immediately expected that school's broadcast would replace teachers, lecture broadcast would replace university instructors, and multimedia would replace schools and universities (Perelman, 1992). The fascination of technical innovation always ensnared people to forget about the difficulties of pedagogical instruction. Distance teaching, especially open universities, can be seen as another forerunner of MOOCs – since like MOOCs they do not require formal learning prerequisites for enrollment. Lastly, the so-called virtual universities, which wanted to use the Internet as a distribution channel, may also be seen as a forerunner of MOOCs. In my book „Virtuelle Universität – Virtuelles Lernen“ (Schulmeister, 2001, p. 407-425) I listed approximately 180 institutions that were created in a short period since 1998, often called themselves virtual university, and wanted to act as educational providers on the Internet. Around the turn of the millennium I already pointed out that I, in opposition to the then popularly expected major market share of virtual universities, saw a better chance of success to establish complementary forms of on-campus studies and virtual education than to establish pure virtual universities (p. 119). Today, just a few of these institutions still exist, mostly as continued education departments of universities or training companies of publishing houses. A few of the virtual universities tried to act as producers of lectures, too.

Thomas Rollins, founder and director of the Teaching Company, which distributed lecture recordings under the brand „The Great Courses“, reported recently about the short life time and amount of money spent by some related companies:

Lecture providers	Affiliation	Investment (in Mio.)	Life time
<i>Teaching Company</i>			<i>1998-2006</i>
<i>NYUonline</i>		<i>21.5 \$</i>	<i>1998-2001</i>
<i>Fathom.com</i>	<i>Columbia U</i>	<i>25 \$</i>	<i>2000-2003</i>
<i>UNext</i>	<i>Chicago, Columbia BS, London U, Stanford</i>	<i>180 \$</i>	<i>2000-2003</i>
<i>AllLearn</i>	<i>Oxford, Stanford, Yale</i>		<i>2001-2006</i>
<i>Global Education Network</i>			<i>?-2005</i>

Table 1. Data according to Thomas M. Rollins, The Chronicle of Higher Education, 20.01.2014

Already at that time it was foreseeable that virtual learning will address mainly continued education of established employees (Schulmeister 2001, S. 358). This trend shows again for xMOOCs, even though the propaganda of Coursera likes to put 13 year old Pakistani girls into the spotlight as beneficiary of MOOCs. [3]

Parallel to the development of virtual universities, online courses at US colleges were created and turned into a real success story. Since 2002, Elaine Allen and Jeff Seaman from the Sloan Center for Online Education collect and publish respective data on an annual basis. The first report on 2002 registers 1.6 Million enrollments in online courses. Until 2012 the number of enrollments increased to 6.7 Million at a slightly slower incremental growth rate. The Sloan report of 2013 registers 7.1 Million enrollments. 80% of these enrollments come from undergraduates from Community Colleges, who are interested in obtaining a transfer permit, and not from bachelor students of a university (latest Report of the Sloan Consortium, Allen & Seaman, 2014; a more detailed analysis of the reasons for this development at the level of 3.6 Million enrollments can be found in Schulmeister 2006). This can be seen as a great success, even though most courses serve as preparatory courses or remedial courses, and the students name "convenience" as the main motive for booking an online course (Schulmeister, 2006), since these courses have proven necessary to allow a 2-year associate degree college alumni to transfer to a 4-year Bachelor degree program. Another contributor to this development are accredited study programs of classical distance teaching universities such as the University of Phoenix with over 900.000 students or Walden University.

The position of xMOOCs in the US educational system

A well-known characteristic of the US educational system are the sometimes immense tuition fees, a less known characteristic is the differentiation of types of degree-granting institutions of learning into Community Colleges, 2-year Colleges, 4-year Colleges,

Universities and Professional Schools or the differentiation of degrees into Associate, Bachelor, Master, undergraduate and graduate education or public and private institutions. A MOOC policy aiming at integration into the educational system needs to acknowledge these differences. At Colleges general education plays a major role, while 4-year Colleges and Universities focus on specialization and respective bachelor and master programs. Unlike in most European countries, students in the US live on campus in dormitories, participate extensively in academic activities, study in small groups, and by the majority enjoy good and direct contact to faculty members (as confirmed by the NSSE (2013) investigations, which use student-faculty relation as an important engagement indicator).

In the Study of Undergraduate Students and Information Technology (Dahlstrom, Walker, & Dziuban, 2013, for Educause ECAR), students of the respective universities were asked about their interest in participating in online courses. The study concludes: „they seemed interested until they were informed that they would be in the course with 10,000, or 30,000, or 100,000 other students. At that point they scoffed at the idea and – unprompted - reiterated that one of the things they like about their current education paradigm is the ability to make personal connections with their instructors.“ [4] The important role of a tight relationship to the campus and faculty may explain why US students are not interested in MOOCs. Only 3% of participants in MOOCs are students regularly enrolled in US universities (Dahlstrom, Walker & Dziuban, 2013, p. 18).

The MOOCs' inventors initial intent, the fundamental change of the US tertiary education system, has been disproved by the initial target audience. Since US students, too, need their time to attend courses and complete exams, participation in a MOOC compares to luxury and would probably require too much time. There is another astonishing phenomenon: a few universities offered the possibility to exchange certificates for credits if students passed an additional exam at the university. However, so far no MOOC participants did apply for this option (Schulmeister, 2013, p. 55). To interpret this observation, one needs to be aware of the strategic position of MOOCs compared to 2-year and 4-year institutions with their undergraduates and graduates, which will be discussed in the sequel.

Since it is not the US students who are interested in xMOOCs, from which demographic groups do the participants of xMOOCs come? What explains the switching of Udacity and Coursera to the market of postsecondary continued education? Interesting data can be found in different analyses of xMOOCs, such as the user statistics included in the evaluation of MOOCs of Duke University (Schulmeister, 2013, p. 27-28). Of course, the numbers vary according to the selection of MOOCs, which were analyzed. However, the results are quite similar. An analysis of 32 MOOCs of the University of Pennsylvania, which constituted more than 20% of Coursera users in July 2013, showed: „Across all geographic regions, MOOC students have very high levels of educational attainment: 83.0% of students have a post-secondary degree (2 or 4 years), 79.4% of students have a Bachelor's degree or higher and 44.2% report education beyond a Bachelor's degree. The educational attainment of MOOC students across the world by far surpasses the general educational attainment of their national peers“ (Christensen, Steinmetz, Alcorn et al., 2013). The majority of MOOC participants not only possess a university degree but almost 70% are already employed and their mean age in this study was 36 years. [5] Thus, Hollands & Tirthali (2014, p. 62) argue: „the evidence suggests that MOOCs are currently doing more to increase gaps in access to education than to diminish them.“ The demographics of xMOOC users emphasize that the main motives of participants are continued education

complemented by curiosity and fun. [6] A comparison of data from Coursera courses, Stanford courses and courses from HarvardX and MITx reveals that they show a similar profile regarding countries of origin and educational level of participants but differ with respect to the percentage distribution. Nevertheless Harvard and MIT come to the same conclusion: „HarvardX and MITx registrants are not ‚students‘ in a conventional sense, and they and their behavior differ from traditional students in K-12 and post-secondary institutions.“ (HarvardX and MITx, 2014, p. 32)

The universities that support Coursera and edX officially and financially and whose professors offer courses, rejected right from the beginning to accept MOOC certificates as credits of their own. Several universities and professors who offered MOOCs argued that MOOCs are not equivalent to face-to-face courses on similar content, which related mainly to course length and, thus, content coverage (cf. Hollands & Tirthali, 2014, p. 44). Another argument is that acceptance of certificates of external participants would violate the principle of equality, as students would need to pay tuition fees. This argument was elaborated by Caroline Hoxby (2014) in her expertise for NBER, the National Bureau of Economic Studies, and discussed using universities with a large amount of endowment capital as an example. In the following, her argument is discussed in more detail.

The division of highly selective postsecondary education (HSPE) consists of universities that accept only few students based on strict criteria. Less than 10% of the students pay the full cost, the cost of the other students are covered up to 80% by endowment capital and other sources. Thus, the majority of students does not pay the excessive tuition fees but receives stipends from endowment capital. In return the universities expect alumni to contribute to endowment capital by donations. Hoxby denotes this relationship as an „intergenerational virtuous cycle“, which worked well in the past. In addition, an important property of studying at an HSPE is the direct contact to faculty during interactive teaching. Since the many participants in an xMOOC prevent both an intensive interaction between students and instructor as well as an assessment of individual exam performance by the instructor, a consequence for HSPEs is: „They cannot afford to invest in students who do not have the aptitude and motivation to benefit from the advanced education they provide.“ Even professors from Harvard consider the conflicting goals of selective universities as unresolved: „The problem why/that? MOOCs are underscoring is that Harvard has contradictory goals of increasing its footprint and protecting its brand. Brand has value by being limited. The two goals paralyze each other.“ (Chris Dede, oral contribution cited from Hollands & Tirthali, 2014, p. 70)

Acceptance of certificates of external participants as credit hours by HSPEs would signal enrolled students that the value of their university place is diminished, and thus the virtual cycle students (=scholarship students) – alumni (=donators) would break. Did Harvard pay attention to the expertise, and did they acknowledge the argument? In any case, Harvard immediately took a new measure: Harvard offers exclusive MOOCs for their alumni, „HarvardX for Alumni“ (<http://alumni.harvard.edu/x>).

Institutions of non-selective postsecondary education (NSPE) have other system-inherent conditions. Non-selective institutions fund themselves from tuition fees and act like service providers, which serve teaching for fees. „NSPE is the simple selling of current educational services for current payments.“ (Hoxby, 2014, p. 1) Hoxby sees this division of the educational system as a point of attack for xMOOCs, since the „ typical NSPE course covers standardized material and does not differ much from courses offered by secondary

schools. Indeed, a non-trivial share of NSPE courses cover the same material that appears in secondary school curricula.“ The 2-year colleges are not yet concerned with disciplinary scientific education but with general education in math, writing, reading, and introductory courses in history, geography, accounting, and psychology. „Most NSPE courses are designed for students who are no more than minimally college-ready, as defined by ACT.“ (Acronym for American College Testing; <http://www.act.org>) By concluding, „This suggests that MOOCs may provide viable substitutes for NSPE courses that are already effectively summarized by certificates“ (p. 13). Hoxby accepts that xMOOCs compete with remedial online courses (such as introduction to math or statistics). Most xMOOCs, however, constitute educational offers that require a certain level of prerequisite education above the level of general education at colleges, which makes them unsuitable for most undergraduates. Thus, this differentiation, too, definitely assigns xMOOCs to the market of continued education.

From the institutional perspective, replacing standard courses through xMOOCs may comprise two risks: Firstly, the way to substitute professors by lecturers would be eased. Secondly, the up to now well used and respected online courses (Allen & Seaman, 2014) would get competition. This may perhaps also apply to the University of Phoenix, which offers complete curricula in distance teaching mode with more than 100 study centers across the US – which may possibly protect it well against pure online competition.

A further element of the educational system is accreditation. In the US all universities and study programs are accredited, in Europe this is true since the Bologna reform. The American Council on Education tentatively accredited five MOOCs (Inside Higher Ed, Doug Lederman, 7.02.2013). Accreditation of study programs including MOOCs seems possible, but probably there will be only few study programs consisting solely of MOOCs in computer science related disciplines, such as the study program of GeorgiaTech from Udacity or the xSeries of edX. Accrediting all individual courses of the big three vendors, Udacity, Coursera and edX, is unthinkable and probably also not financially feasible.

xMOOCs became a mass phenomenon, but unlike often claimed, they had no disruptive effect on the educational system in the US. On the contrary, corresponding intentions of the MOOC pioneers were tacitly dropped. xMOOCs did not develop system properties that would be needed for impacting the educational system. Instead of becoming a political-social system they remained one classical didactical e-learning concept among others. It is open to debate, whether private MOOC providers can sustain their current position for long without developing entirely new business models. As an individual offer of individual universities, which may fund the high cost of development, operation and sustainability of MOOCs, MOOCs are always a possibility. Therefore, it is important to discuss business models for xMOOCs, and their development.

Are there business models for xMOOCs?

Obviously, another business model than the initially intended is needed to sustainably provide xMOOCs (business models for MOOCs in general are discussed in Bershadskyy, Bremer & Gaus, 2013). An example is a contract with universities about online study programs, which lead to study programs more or less closed and liable to pay costs. The result contradicts the original idea of MOOCs (open for everybody without educational

prerequisites, for free and for large number of participants) as it requires enrollment, fees, and limits the number of students (in order to protect campus students). Udacity, Georgia Institute of Technology and AT&T undertake such an experiment. They offer the online master program MSc Computer Science for less than \$7.000, which is cheaper than the on campus programs of Georgia Tech.

This experiment still aims at the postsecondary education segment of universities. Such undertakings will remain exceptions. There are two specific reasons for this individual project: Firstly, it is a computer science program for which Udacity is well-suited to provide content, the computer is a suitable medium, and the target audience is computer affine. [7] Secondly, there may be enough demand for an online master program, as long as it is cheaper as an on-campus program. However, as soon as the fees for MOOCs increase one will recognize that “no cost” was a part of the attraction of MOOCs. And the fees will need to increase when mentoring by (trained) tutors is offered, and all actors are paid according to their effort.

An example of a psychology xMOOC at the University of Texas at Austin illustrates the fact that total cost has an important impact on demand, even for people interested in continued education. The MOOC aimed at both, their own students and external people. The intended number of participants was 10.000. 125 staff members were involved in the development, without receiving extra pay. Nevertheless, the fee for external participants was \$550. Eventually, less than 50 external people enrolled (Thomas M. Rollins, MOOCs: Been There, Done That, *Chronicle of Higher Education* 20.01.2014). This may serve as an example for Caroline Hoxby’s (2014, p. 16) argument: „A tragedy of the commons may occur: no one will want to pay for the creation of a course that is offered for free.“ (for “tragedy of the commons” see Wikipedia)

Recent attempts of the three MOOC providers to develop new business models give a desperate impression: Coursera offers a signature track with cost and controlled exams, but participation up to now is low (Hollands & Tirthali, 2014, p. 44, report 39 resp. 37 people from 80.000, who accepted the offer). edX offers the edX series of certified courses for \$425 and so-called “white label” MOOCs aimed at corporate members, one could denote them also as corporate MOOCs. In addition, edX offers exclusive MOOCs for alumni (see above). edX also offers some courses for more than \$1.200. “Coursera Specifications” consist of „Focused Programs in Popular Fields“ with cost. Udacity introduced coaches to be rented, and offers courses for \$150, at this time with discount for \$105. The courses at Georgia Tech cost \$134 per credit, the courses of SJSU cost \$150 each (3-5 credits). All three MOOC providers search for partners to set up small scale projects focusing on courses that are restricted by their local nature, subject and small number of participants, and which require much work and will eventually not earn enough money to finance the many free open MOOCs. According to Kelly (2014, p. 12) it becomes apparent that „Each of the big three has developed some variation on the ‚freemium‘ model, whereby consumers can access basic courses and assessments for free but must pay for additional services like exam proctoring, coaching, and feedback.“

MOOCs require much money, demand large amounts of time from the involved people, require much staff, and need more infrastructure and resources than classical activities. Hollands & Tirthali have analyzed the costs of four cases in detail. They report that MOOC development costs between 39.000 and 324.000 dollars and that there are MOOCs which need additional tools which might cost between 750.000 and 1.2 million dollars. But so far

none of the involved people is compensated for their time, nerves and the time lost for research and publications. Caroline Hoxby uses an interesting analogy to point out that the business model of MOOCs is actually in the phase of early capitalism, since most actors are not (yet) paid for their engagement:

„People usually fail to take account of the fact that MOOC ‚stars‘--the few instructors who are such extraordinarily charismatic and effective communicators that they can replace many in-person instructors--will ultimately need to be paid like stars. With MOOCs, we are currently in a period much like that of the early Hollywood studios: film stars were paid little and the studios captured all the rents. This system did not last because, ultimately, it was the stars and not the studios that were scarce. Today, actors whose presence can ensure that a film is profitable are paid the rents associated with their special qualities. If MOOCs become popular, the most sought-after instructors would end up with the rents. They would not continue to work for whatever salary their home institution pays them. The current pay structure is obviously unsustainable.“

Still, xMOOCs live on the promise of high scalability to keep the cost per student low. Let us assume all people involved would be paid according to their effort, then the goal „to bend the cost curves“ (Koller) could not be achieved. In this case the budget problems of most US universities could lead to imminent danger: MOOCs are bought, staff cost is reduced, and professors are replaced by lecturers to tutor the flipped classroom (an accompanying measure for on-campus students).

The general situation of the tertiary educational system in Germany and Austria is different: Here, tuition fees are unknown. Why, then, should German universities be interested in MOOCs and be willing to pay the high cost? So far, I have not heard any reasoning from a German university, with a professor offering a MOOC, why they participate and what they hope for (other than “trying it”, “testing”). Why should a university invest money, staff and resources to offer courses to external people, who will never study regularly or who have already finished their studies [8] – since 80% of the participants of MOOCs have already received a BA/MA degree? [9] The interview study of Sandeen und Jaratt (2013) identifies the following motives of MOOC providers: “A common motivation was reputational, and also for outreach and dissemination of knowledge; and another was to provide an incubator for new ideas.” Similar motives are identified by Hollands & Tirthali (2014) in their interviews with MOOC lecturers: increase of range, creation of a brand, and improvement of cost effectiveness are the three main motives (p. 50); which leaves open if and why the increasing of range could be a meaningful goal, and that the improvement of cost effectiveness is hardly achievable. The statements cited by Hollands & Tirthali for this criterion come, among others, from people working in a Distance Learning University (division of ACE). The increase of range through addressing people from developing countries is mentioned by 2,7% of the participants (Hollands & Tirthali, 2014, p. 57). Another frequently mentioned motive for MOOCs in study programs is the replacement of standard courses with 100 to 1.000 students. But the problem is that exactly for these courses the necessary tutor support or the required number of flipped classrooms cannot be provided. Without such support a simple lecture recording may be more effective. In

addition, these courses are mostly targeted at novice students, and for them mentoring is more important than content (see also the interview with Janet Napolitano, president of the University of California, <http://www.youtube.com/watch?v=KZPfSS8wVwg>).

If the reduction of dropout rates through better mentoring is the most pressing problem of European universities then the engagement in MOOCs seems counterproductive. Private universities demanding tuition fees may profit from MOOCs, especially when aiming at foreign students. [10] A public university may use MOOCs to strengthen up-to-now stagnant continued education (which, according to respective laws, needs to compensate their cost by fees). However, this would require designing specific courses for people interested in continued education. Despite clear signals from the US, some German Universities of Applied Sciences have announced acceptance of certificates and transfer into credit points. An integration of MOOCs in study programs was so far not reported.

In my opinion, such integration would fail for a number of reasons:

- A feasibility study of Krüger, Kösling & Krekeler (2013) for the State of Lower Saxony, the seed money for developing the required infrastructure is about 0.5 to 1.0 million Euro per State. The annual cost for running a MOOC is not much lower, as Coursera and edX calculate between 100.000 \$ and 400.000 \$ per MOOC development and 50.000 \$ per repeated offer. [11]
- The copyright law for online courses, such as MOOCs, and their content and design is up-to-now not clearly regulated. Even if the contract with the MOOC provider includes clear copyright regulations, the rights on content remain unclear between the professor and the university (Carl Straumsheim, Inside Higher Ed, 18.03.2014). This question may lead to conflicts, if professors move to another university. Are regulations similar to authors and publishers or similar to patent law more appropriate?
- For purposes of testing some professors may be willing to develop a MOOC, but nobody can afford to neglect their original duties for several semesters in order to run a MOOC regularly, except universities or their countries would be willing to pay for the complete cost (including lecturers, salary increases, and additional staff). Experiences with budget cuts and saving cost make this extremely unlikely.
- Engagement in MOOCs cannot be recommended to young lecturers or professors, as Malte Persike points out in his presentations (<https://lecture2go.uni-hamburg.de/konferenzen/-/k/15567>). He offers MOOCs in research methodology and statistics at the University of Mainz, Germany. Developing and running a MOOC requires extreme effort, leading to longer academic qualification periods (e.g., time needed for a habilitation) and threatening academic careers. Persike calculates 3,5 hours for a traditional lecture hour (45 minutes) including preparation, giving the lecture, and providing additional material. However, he estimates the time needed for an hour of MOOC as 25 hours (6 hours for script writing, 3 hours for recording the speaker, 3 hours for additional recordings, 7 hours for post-production, 4 hours for publishing and material, and 2 hours for maintenance), exceeding the traditional lecture by a factor of 7. Oliver Vornberger, University of Oldenburg, Germany, calculates 32 times the effort required for a traditional lecture. Both, Persike and Vornberger, did not include the time and costs for teaching the flipped classroom, the cost for tutors, if the number of students makes those necessary.

However, the most important reason why MOOCs are not easy to integrate into a bachelor system are the students themselves, since a MOOC demands much more workload than a traditional 2 hours course per week. This statement may deserve an explanation: Current study organization of most bachelor programs expects that all lectures of the five or six modules per semester are held in parallel during the 14 weeks of the lecture period. Sometimes, this amounts to 8-12 classes requiring 16-22 hours of presence. Usually, students accomplish this because they do not actually participate in all classes, skip preparation or post processing of classes, or delay exam preparation until shortly before the exam ("cramming"). Since the ZEITLast-study (Schulmeister & Metzger, 2011; Schulmeister, Metzger & Martens, 2012; Schulmeister, 2014) we know that students in Germany do not spend 40 hours per week for studying (median 23 hours per week, meaning that 50% invest less than 23 hours per week in their studies), and do not seem to want to invest more time in their studies as other interests interfere. Nevertheless many students feel subjectively overworked due to exam pressure. [12] Thus, if the university would require them to participate in one or two MOOCs per week the resulting workload could not be managed, since MOOCs require double or more effort in the respective week and require submission of assignments in the respective week. Consequently, MOOCs can only find a place in a study program if the required time is exempt from other classes, or by creating blocks consisting of all courses of one module (Metzger & Haag, 2012). Only then competition between on-campus courses and conflicts with requirements of other teachers and the effort needed by a MOOC could be avoided.

Diversity: Reviewing the question of success

There is an enormous discrepancy between enrollment in xMOOCs and a drop-out rate above 90%. [13] Supporter of xMOOCs hastily try to justify this discrepancy by publishing papers with the aim of redefining the terms drop-out, success etc. (DeBoer, Ho, Stump, Breslow, 2014) in order to argue that for MOOCs the high drop-out rate is meaningless. 9 out of 22 papers in the proceedings of the European MOOCs Stakeholders Summit (2014) broach the issue of drop-out rate in their title. They try to legitimate the high drop-out rate and to explain low participation. For European stakeholders in MOOCs this is important since they apply for EU funding, and thus need to get rid of the argument of ineffectiveness. It is understandable, too, since a major part of the difference between enrollment and completion can be explained by the fact that many interested people enroll but, when the course starts, do not have the required time or interest any more. Explanations for this behavior (Baker, Evans, Greenberg & Dee, 2014) are based on the theory of human capital or use the concept of consumption value from behavioral economics, assuming "students weigh the human capital and consumption value benefits of pursuing an online course against its costs." (Baker, Evans, Greenberg & Dee, 2014, p. 6) But there is more to it.

Individuals have different motivations, which they are not necessary aware of. Thus, rational hypotheses or models are not sufficient to explain their actions. Such aspects of human behavior involve normative reasons and go beyond pure strategic action. Motivation for enrollment in a MOOC may include curiosity (subjective or professional), a conflict (Daniel Berlyne; http://en.wikipedia.org/wiki/Daniel_Berlyne) or an experience of cognitive discrepancy (Leon Festinger; http://en.wikipedia.org/wiki/Leon_Festinger), or a promise of entertainment or fun. It may also relate to an expectation of competence gain, which was

triggered by a course announcement (perfectly understandable given the large number of employed people enrolling in a MOOC), to the wish of being part of the community of MOOC supporters, or to the inner need to test their independence in learning and to see their autonomy confirmed. All these needs can be explained by Maslow's hierarchy of needs (Abraham Maslow; http://en.wikipedia.org/wiki/Maslow's_hierarchy_of_needs) or Deci & Ryan's self-determination theory (Edward L. Deci & Richard M. Ryan; <http://www.selfdeterminationtheory.org/theory/>). Actually, some of these motives are selected by many participants of surveys of MOOC users, especially fun and competence. But it may also be simply the motive of "convenience" (i.e. the chance to participate in courses without having to drive or to leave family), which plays an important role in the US for online courses and especially for employed people (see Schulmeister, 2006).

However, when the course begins there are many reasons for not participating: demands from family, commitments to work, inappropriate content or time, too frequent tasks etc. The psychological and social diversity of the behavior of such large groups cannot be rationally explained by formal concepts. It is probably not a single motive, which explains the drop-out rate, but a combination of many motives.

50% of the enrolled people do not enter the xMOOC; this group can be considered unproblematic. However, another group of 40-50% begins the course, i.e. views some videos and tries some tests, before dropping out. Here, we can assume that these users probably intended to complete the course. It is this group that is not sufficiently considered in all analyses of drop-out. These participants fail due to lack of support when being stuck, due to the rigorous timing of events being incompatible with other commitments, or due to problems with their own motivation (inclination to distraction, procrastination) or with their own learning behavior being incompatible with the rigor of the didactics of MOOCs. Psychological and didactical analyses of groups of learners always show a large diversity. Since motivational psychological studies of MOOC participants are yet missing, analogies from other study programs may serve as a source of hints. The empirical studies from the ZEITLast project may here serve as an example. In these studies the diversity of students was analyzed according to a motivation theory (Metzger, 2013) and the integrated learning and acting model (Martens & Rost, 1998) in large samples from three disciplines, business administration, education and computer science (Schulmeister, Metzger & Martens, 2012; Metzger, Schulmeister & Martens, 2012).

The didactical structure of typical xMOOCs consists of small phases of input and frequent tests (see next section). Thus, self-determined motivated learners may be bugged by strict guidelines, small steps of learning and permanent testing – leading to drop-out. It seems more likely that anxious learners and learners being uncertain about their competences are willing to abide by the strict guidelines and will benefit from small step feedback increasing their emotional security. Many of these learners feel uncomfortable in direct contact with instructors, which would explain the low participation of even the active learners in forums. Those who abide by the scaffolding offered by the MOOC structure do not need to prove their independence. Thus, xMOOCs cannot be expected to foster autonomy of learners.

Pragmatically proceeding learners, who may well estimate how to produce maximum effect with minimal effort, will probably also not benefit from xMOOCs. Successful MOOC participants must not be confused with self-determined learners, just because they completed the MOOC. The power of endurance of successful participants is fostered

through strict guidelines, and is externally motivated. Thus, xMOOCs seem to be a teaching model similar to the behavioristic Personalized System of Instruction (PSI) of Fred S. Keller (1968), which allows dependent learners a feeling of success.

This evaluation means that this kind of learning is less suited for other types of learners, and will in the long run lead to similar drop-out rates. Learners, who otherwise tend to procrastination and to give in to distractions (note that distractions are common for learning individually with a computer), may supposedly not be able to keep up with the strongly clocked approach of xMOOCs, except when accepting it as an external scaffolding. For them, Udacity offers tutors as support to prevent learners becoming stuck without a possibility to ask questions. This service (denoted as coaching by Udacity) has to be paid for.

Communication in forums has not lived up to the expectations of the providers, too, since the activity in forums is adversely affected by the low participation of 3% (Coetzee, Fox, Hearst & Hartmann, 2014). The large number of participants leads, of course, in spite of a low participation rate to an enormous number of contributions, which may hide the fact that only few learners actively participate. It is well known that those who post often are responsible for almost 50% of the posts. This means also that 90% of active participants create only one post. One could perhaps assume that those who actively learn in an xMOOC would also participate actively in the forums. This is wrong. Here, too, are different motivations at work: fear of failure, display of one's weaknesses, or the wish for anonymity. Attempts to prompt participants for active participation by using different phrases (collective, individual, neutral) failed (Kizilcec, Schneider, Cohen & McFarland, 2014). There are not one but many reasons for the reluctance of learners to participate. This, too, is a sign of the diversity of motivations, which cannot be addressed by such simple experimental interventions.

Learning in xMOOCs

xMOOCs are pure instruction, similar to traditional lectures their lecture videos serve as a means for imparting information. They differ from lecture recordings with respect to the partitioning into small segments, some of which are only a few seconds long (e.g., see Udacity video on introduction to statistics) while others take several minutes (10-15 minutes for Coursera), separated by a multiple-choice test. This method is geared to behaviorism, similar to programmed instruction. In total, videos sum up to an hour per week. The interruptions by tests and following feedback serve the maintenance of attention and self-assurance of the current level of learning. This structure resembles study material in distance teaching, which are equally segmented and interspersed with questions and tests. In fact, xMOOCs resemble distance teaching more closely than on-campus studying (lectures left aside). There are people who like to consider the videos of finished xMOOCs as a replacement to regular textbooks as used in the US. This would lead to the same problem of selection as in the case of textbooks in European universities: "not invented here". This kind of comparison (e.g. MOOCs vs. lecture) is the fact that on-campus study with its seminars, exercises, labs, excursions and tutored learning groups provides a much richer culture of learning, learning environment and multiplicity of methods than xMOOCs.

xMOOCs thus follow a specific didactical design (Schulmeister, 2013, p. 30-37), which addresses extrinsically motivated learners and seems suitable for them. [14] For all other types of learners xMOOCs display didactical weaknesses. xMOOCs are suitable for imparting knowledge; they are less suitable for facilitating understanding or training of problem awareness. Thus, it would be sensible to evaluate the success of xMOOCs with respect to imparting knowledge. Feedback refers to multiple-choice answers and is mostly purely formal, not related to content. Exercises or tasks that require answering problem-oriented questions by free writing are not possible. As soon as understanding, interpretation and appraisal is needed, which is often the case in social sciences and the humanities, essays are used, which due to the sheer mass cannot be examined by instructors but by peer-review. This leads to problems when peer-review is performed by untrained learners. In light of this, pronounced design it is questionable whether one should invest much effort to turn xMOOCs into problem-oriented pMOOCs or MOOCs for self-regulated learners. Problem-oriented and self-regulated learning can be better supported by other learning environments on the Internet. Despite this, there will be soon many variants that try to circumvent the big burden of the first MOOCs; SPOCs, DOCCs, BOOCs, SMOCs, POOCs, LAPs , etc. are already showing up, the post-MOOC era has begun.

Lecture recordings are taken at many places; some German universities have already collected a large amount of lecture recordings. These videos can be stopped, rewind, and replayed like MOOC-videos, but they are not segmented and do not contain tests. Thus, students must employ the video and process its content themselves. Guidance and self-assurance of the current level of learning is not performed with the video but takes place in the lecture. Learning with recorded lectures demands higher effort from students and their power of endurance. It demands longer and self-regulated phases of attention. However, such behavior is a prerequisite of challenging learning, to reach high-level learning goals, and to facilitate self-determined and autonomous learning (Schulmeister, 2014). The combination of xMOOCs or lecture recordings with an accompanying preferably interactive event is denoted as flipped classroom. This variant should be more successful than pure xMOOCs, just not for external participants. The study from Griffiths, Chingos, Mulhern & Spies (2014) for Ithaca S+R and University System Maryland compares as much as possible controlled design of (?) traditional courses with hybrid courses, which use xMOOCs as learning material. They report the time needed to integrate the xMOOC material, learning success, and evaluation by students. Small differences between learning success between traditional and hybrid courses were not significant. However, the evaluation of students of hybrid courses regarding satisfaction, learning success and interest was significant worse than for traditional seminars. The explanation of the students' negative assessment is interesting; even so this is just a hypothesis that was not studied further [15]: Self-determined students with good prior education gave hybrid courses a bad rating. These students used more time for self-studies outside the course compared to the risk groups, which assessed the hybrid courses neutral or less negative.

The Bill & Melinda Gates Foundation funds several studies mainly on the evaluation of MOOCs. In an interview with the Chronicle of Higher Education (<http://chronicle.com/blogs/wiredcampus/more-from-bill-gates-interview-lectures-will-seem-antiquated/37487>), Bill Gates calls MOOCs a useful method to offer continuous repetition of content. At the same time he shows a preference for social learning in small groups with goals, which cannot be reached in MOOCs:

„Other countries are sending more kids to college. They're getting higher completion rates. They've moved ahead of us. The cost of an education just keeps going up. So you've got to see if you can change the way the system works. Having a lot of kids sit in the lecture class will be viewed at some point as an antiquated thing. On the other hand, having a bunch of kids come into a small study group where peers help each other, where you can explain why you're learning these various topics, that will be even more important. And so the skill sets that you want on the university campus and that you're really valuing and measuring and giving feedback to, I think those are shifting somewhat because we can take the lecture piece versus that study-group piece and make the lecture piece more of a shared element, and not have to have that duplicated again and again.“ (<http://chronicle.com/article/A-Conversation-With-Bill-Gates/132591/>)

Bill Gates apparently sees MOOCs not as a stand-alone method but prefers them in a blended-learning concept. At the same time he emphasizes the important role of the face-to-face modus in didactical meta-communication.

What makes face-to-face instruction so attractive?

John Hattie (2014) examined 13 meta-analyses of 839 studies comparing distance study programs and on-campus study programs. Results vary wildly, their mean effect size is low $d = 0.09$. However, newer studies comparing the variables attrition, retention and success of studying of US online courses with on-campus courses in two states (Washington and Virginia) conclude that drop-out rates of online courses are higher, and weaker students are more discriminated in online courses (Jaggars & Xu, 2010; Xu & Jaggars, 2011). Obviously, the extent and quality of mentoring play an important role for high-risk students.

As already mentioned before, Dahlstrom, Walker, & Dziuban (2013) in their ECAR-study asked students about their interest in MOOCs and registered a clear negative answer. The authors supposed the preference of on-campus studying as the reason of rejecting MOOCs: „Students' current lack of interest in MOOCs is consistent with other student findings such as student preferences for more face-to-face interaction experiences with their instructors.“

What is the benefit of f2f instruction? Obviously, this is a blind spot of research. Often, distance learning and online courses were compared to on-campus learning with respect to drop-out rates and learning results. The comparison was interesting, but structural and functional differences of online and f2f were not of interest. I did not find any study, which explains the benefits of f2f, as identified in evaluations, qualitatively.

The multiplicity of chances to make contact, the interaction with faculty, the connectedness and making of friends, the integration in the university as an institution, the social rites and the social comparison with others, especially related to achievement, the moral and political socialization as well as the culture of a campus and the experience of diversity are among the widely known and most mentioned benefits of on-campus studying. This is not what I

mean when I state that research has a blind spot, since these benefits do not explain the preference of students for f2f instruction but for integration into a university community. The benefit of f2f for learning must consist in something different.

Communication in a virtual space is constrained, especially when restricted to textual mode, but also when video and/or audio channels are provided. Nonverbal communication, paralinguistic or extralinguistic signals are not present in online communication. Seemingly, this has an immense impact on the perception of the effect of presence, since these aspects of communication facilitate an „immediacy of communication“, an immediacy of perception of communication which facilitates an emotional connection to teachers, supports imitation and model learning, and enables, through perception of other students, a feedback to their own behavior and learning achievement (Baringer & McCroskey, 2000; Richmond, 2002; Allen & Witt, 2006). Of course, these aspects of communication do not affect all students in a similar manner, and may stay unknown to many students. Still, the few studies on this topic asking questions related to the perception of communication got positive reactions, and interaction effects between perception of immediacy of communication and cognitive and affective factors in learning have been found (Messman & Jones-Corley, 2001). In face of the impact of the communication behavior in f2f it is understandable, but artificial, when eLearning protagonists try to imitate “immediacy of communication” in online mode by “instructional immediacy” (Kim & Bonk, 2010).

Politics and xMOOCs

The legislative initiative brought in by the Californian representative Darrel Steinberg and governor Jerry Brown (<http://chronicle.com/article/California-State-U-Will/136677/>), which aimed at forcing Californian universities to offer online courses in partnership with Udacity failed due to the combined protest of the California Faculty Association and the academic senate of the University of California (Schulmeister, 2013, S. 45).

The new president of the University of California, Janet Napolitano (governor of Arizona from 2003-2009, secretary of internal security of president Obama from 2009-2013), too, revealed in an interview that she is not convinced that online instruction is the right answer to the challenges of the Californian tertiary education:

„I think there’s a developing consensus that online learning is a tool for the tool box, where higher education is concerned; that it is not a silver bullet the way it was originally portrayed to be. It’s a lot harder than it looks. And, by the way, if you do it right, it doesn’t save all that much money, because you still have to have an opportunity for students to interact with either a teaching assistant or an assistant professor or professor at some level. And preparing the courses, if they’re really going to be top-quality, is an investment as well.“

(<https://www.youtube.com/watch?v=KZPfSS8wVwg> ; the respective passages begin at 31:00 ; transcript: Chronicle of Higher Education, 28.03.2014).

Her criticism of online learning goes way beyond MOOCs, she even questions the function of established forms of the universities’ online courses that serve as remedial courses (Sloan Reports 2003-2012; s.a. Schulmeister, 2006):

„Early on, the notion was you could use online learning to help students who were getting started, for remedial English or math, to be up to speed. I think that’s false. I think those students need the teacher in the classroom working with them. I think where online learning will turn out to be the most useful is to complement the upper-division coursework that we have.“

(<https://www.youtube.com/watch?v=KZPfSS8wVwg> ; the respective passages begin at 31:00) .

Kelly (2014) agrees with Napolitano: „The reality is, MOOCs are a tool, not a solution.“ I, too, see MOOCs as a tool and virtual learning environment but mainly as a method of instruction and a critical method for learning.

Florida is the second US state that was caught by the fever of MOOCs. In Florida, too, a legislative initiative was brought in (House Bill 7029), which was severely modified after strong protest of the United Faculty of Florida before being signed by governor Rock Scott. Meanwhile, it is assumed that the online courses will be offered by state universities, the Florida International University Online (FIU | Online; <https://online.fiu.edu>), the Florida University Distance Learning (<http://www.distance.ufl.edu>) and will be bundled by University Florida Online (UF Online; <http://ufonline.ufl.edu>). There, courses will cost \$150 instead of \$610.77 (Inside Higher Ed, Carl Straumsheim 15.04.2014). At these institutions we will likely find the familiar concept of distance teaching.

Conclusions

So far, xMOOCs have failed to fundamentally change the US tertiary educational system, including the aim of openness, free spreading of knowledge to everyone. Instead, MOOCs are turning into methods for professional continuing education. Their business model consequently changes to cost efficient courses. The open model loses its democratic status.

There are difficulties to integrate the xMOOC model into bachelor studies, because xMOOCs demand more effort from students than normal classes. This may be one of the reasons why so few students participated in MOOCs. Without changing the teaching organization, extending the period of teaching beyond the well-known 14 weeks, and providing more space and time for MOOCs, xMOOCs cannot be accepted by students in on-campus universities.

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[1] Max Chafkin: Udacity's Sebastian Thrun, Godfather of free Online Education, Changes Course. *fast Company*, Tech Forecast, 14.11.2013 <http://www.fastcompany.com/3021473/udacity-sebastian-thrun-uphill-climb>

[2] Jeffrey R. Young, *The Chronicle of Higher Education*, 19.07.2012, Inside the Coursera Contract: How an Upstart Company Might Profit From Free Courses.

[3] <http://blog.coursera.org/post/55578977319/3-helpful-tips-for-younger-students-on-coursera> and <http://blog.coursera.org/post/54132976778/8th-grade-twins-take-astrobiology-and-einstein-courses> .

[4] According to (Babcock & Marks, 2008) US students study on average 26-28 hours per week, while German students spend on average 21-27 hours per week for their study (Schulmeister & Metzger, 2011; Schulmeister, 2014). Thus, students do not seem to have enough time to spend in an additional MOOC.

[5] Ezekiel J. Emanuel: Online education: MOOCs taken by educated few. *Nature* 503, 342 (21 November 2013). Kelly (2014, S. 20) provides an overview of data on this topic from nine empirical studies. See also the report of Stiftung Warentest from 12.05.2014 (motives: 70% „personal continued education“, 43% „for fun“).

[6] Sometimes, I was asked whether xMOOCs can be considered education of a broad public. Personally, I disagree. xMOOCs provide mass education and perhaps freedom of education (Bershady, Bremer, Gaus, 2013) but not education of a broad public because instructors developing and running MOOCs aim at students, and choose the educational background of students as the basis of their teaching. Thus, they assume learning prerequisites above the level of a broad public education. Elsewhere (Schulmeister, 2013, p. 57) I wrote that MOOCs are unsuitable for building study programs except for computer science; here, I did not mean the level of knowledge but the portfolio of topics constituted by a collection of courses.

[7] In my opinion, it is not possible and sensible to develop complete study programs following the MOOC-model in the humanities, social sciences or cultural sciences. However, in IT and technical professions this may succeed.

[8] This question is also asked in the US. Caroline Hoxby (2014) of the NBER is amazed: „But, if Harvard-authored MOOCs do not count for credit, why are Harvard's faculty using their scarce time to author MOOCs rather than to pursue more complex teaching or research? We have already noted that it is unlikely that Harvard faculty have an absolute advantage (let alone a comparative advantage) in instructing a large group of students with diverse preparation.“ See also Hollands & Tirthali (2014, p. 51): Some of their interview partners „question how they will be serving their paying students well by expending such

significant amounts of time and effort to educate the rest of the world, especially when most MOOC participants already have a college education and their own students are still trying to earn one.“

[9] Test report of Stiftung Warentest from 12.05.2014: a finished university degree have 79% off he participants, 59% are between 30 und 49 years old, two thirds are employed, only 8% are students. s.a. Kelly (2014, p. 20).

[10] Despite the fact that a MOOC may not be a good advertisement for the universities' teaching model, since MOOCs and face-to-face teaching are very different.

[11] Hollands & Tirthali, 2014, p. 134 ff., present cost details. Using four case studies, they estimate the cost of a MOOC between \$39.000 and \$325.300 (p. 138) under current conditions, i.e., using staff without payment for the additional work.

[12] Of course, some students invest much more time in their studies, but there are equally many who invest even less time in their studies. Variance is most important in case of such data.

[13] According to Jaggars & Xu (2010) und Xu & Jaggars (2011) the completion rate of online courses is relatively low, too, but still much higher than it is the case for the SJSU-MOOCs. Kelly (2014, p. 23) reports the completion rates from several studies.

[14] Walden refers to some early essay containing criticism of lectures Walden (2013, p. 161). However, this does not mean that MOOCs „have incorporated decades of research on how students learn best“, since the MOOC pioneers initially did not know much about learning and instructional research, as indicated by many of their statements (Schulmeister, 2013, p. 30-32). They did not even know research and didactical models such as Behaviorism, which could be considered immediate antetypes of MOOCs.

[15] „It is certainly possible that traditional- and hybrid-format students differed in their unmeasured traits, such as motivation or perseverance, which are not captured by the characteristics we observed“.