The potential and problems of MOOCs
MOOCs in the context of digital teaching

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Der Reader nimmt eine Situationsanaly-
se zu MOOCs vor und erörtert mögliche
Anwendungen bzw. Anwendungsszena-
rien.

This reader offers an analysis of the
current situation of MOOCs and discuss-
es fields respectively scenarios of possi-
ble applications.

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Foreword by the President

Universities have been examining digital teaching in its various formats for some time. These formats include e-learning, Web 2.0 formats for teaching and open educational resources. One form of digital teaching in particular, Massive Open Online Courses (MOOCs), has excited public interest.

The appraisal of a MOOC must take account of its type, the motivation for its creation and the target groups it addresses. MOOCs are resource-intensive and therefore not a means by which to save money. However they can be useful tools for specific purposes, such as university market-ing, transitional programmes, minor subjects or interdisciplinary lecture series.

On a strategic level, leaders of higher education institutions management will state their positions on digitalisation, taking into account their own priorities and target groups. On an operational level, university lecturers will decide whether, when and to what extent digital teaching formats should be used. This is in line with the freedom to teach guaranteed in the constitution.

Higher education institutions and university teachers will investigate whether they should offer digital formats on their own or in collaboration with other universities or with external platforms. The choice of platform is informed by marketing considerations, business models, the services provided and, last but not least, by creative freedom.

The HRK, the Stifterverband in Germany and the Centre for Higher Educa-tion are conducting a joint project in which they are pooling their experi-ence with new digital formats. The "Hochschulforum Digitalisierung [Higher Education Forum on Digitalisation]" will aim to develop practice-oriented solutions for German universities, together with specific recom-mendations for action, while also supporting innovative pilot projects and initiatives.

The HRK will continue to monitor the process of digitalisation.

I hope that in setting out some basic information, conceivable application scenarios, the potential and the problems, this reader will make a useful contribution to the discussion on the process of digitalisation.

Professor Dr. Horst Hippler
President of the German Rectors' Conference

Summary for management of higher education institutions
Massive Open Online Courses (MOOCs) are digital teaching formats
which offer stimuli for developing the concepts of e-learning, Web 2.0
and open educational resources. They can be used before, during and
after completion of a degree course and can also be integrated at course,
module or degree programme level in academic teaching.

Connectivist MOOCs - cMOOCs - have been held since 2011. They priori-
tise the self-organisation of learning in seminar and colloquium-like
situations. Extended or xMOOCs have been a focus of public interest
since 2012.

MOOCs offer much varied and innovative potential in their wide geo-
graphic range and their ability to reach many and diverse participants,
and in their use of collaborative formats and transparent teaching.
MOOCs can also realise added value in certain areas. These include mar-
keting, transitional programmes, standardised mass events, minor sub-
jects, blended MOOCs, cMOOCs, interdisciplinary MOOCs and certain
aspects of lifelong learning.

However, MOOCs are also associated with problems and risks. Some of
these are open access to MOOCs, integration into degree courses, the
legal framework and the sustainability of their business models.

MOOCs are very resource-intensive to produce and run and are not a
suitable means by which to cut costs. Substantial amounts of time and
money are required for the virtual platform, design, production, teaching,
evaluation and the development of content and technology.

Digital teaching and classroom teaching are not contradictory. It is possi-
ble that in the future, there will be more than one place for teaching.
However, a social interaction so constrained by conditions as learning
requires a minimum level of personal confidence and the interplay of
different sensory inputs.

A scenario at a higher education institution

President Schmidt is addressed by her vice-president with responsibility for teaching, Professor Meier, who has just returned from an information event about the potential of MOOCs.

Meier: "MOOCs are a revolution[1] for universities. They will change teaching like a tsunami[2], particularly in higher education and make 'Harvard for everyone'[3] possible!"

Schmidt: "I don't see it like that. MOOCs are nothing new[4]. We need education, not cartoons[5]. We can mess up with MOOCs.[6]"

Meier: "MOOCs use the opportunities offered by social media. Interactive formats allow peer learning and thus the learning community can regulate itself."

Schmidt: "You are over-estimating them. Self-regulation leads to a herd mentality, making quality assurance impossible. Education can only be provided through personal interaction. It's not surprising that the drop-out rate is so high."

Meier: "That's not the right way to look at them. MOOCs offer new opportunities for education. Any participation is a positive gain. MOOCs are contributing to the democratisation of education."

Schmidt: "How would you hold legally incontestable examinations and award grades? And it wouldn't be possible to give or credit ECTS points on such a weak basis."

Meier: "New methods such as Signature Track, self-grading, peer-grading and badges are being developed. It is also possible to combine MOOCs with classroom examinations. And ECTS credits can be awarded."

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[1] See Thomas L. Friedman, New York Times, 26.1.13.
[2] See John Hennessy, President of Stanford University, in: Global Strategies, http://daveporter.typepad.com/global_strategies/2012/04/stanford-online-learning-theres-a-tsunami-coming.html, 29.4.12.
[3] See. Spiegel-Online, http://www.spiegel.de/unispiegel/studium/online-studium-berkeley-harvard-und-mit-starten-edx-a-854011.html, 6.9.12.
[4] See Rolf Schulmeister, 23.11.12, quoted by Jochen Robes, Weiterbildungsblog, http://www.weiterbildungsblog.de/2012/12/, 14.12.12.
[5] See Josef Joffe, in: Die Zeit, 20.6.13.
[6] See Tom Jork, Blog, http://www.lehrerstuhl.de/2013/03/26/mooc/, 26.3.13.

Schmidt: "Where are we supposed to get the resources? It takes two years and costs €500,000 to produce one MOOC. At the same time we need to offer teaching via the conventional routes. That's why MOOCs are often teaser offers with considerable subsequent costs."

Meier: "You are exaggerating. 6 months and €25,000 are enough. There are also sustainable, fair business models where participants, external funders and companies contribute to the finances."

Schmidt: "And anyway, MOOCs are not compliant with copyright, higher education and funding legislation or with data protection."

Meier: "That's not true. The law reflects structures that have existed hitherto and must be adapted to innovation in society."

President Schmidt and Vice President Meier realise that they will not arrive at any new insight with this increasingly acrimonious discussion, so they determine to read the HRK's paper on MOOCs first.

1. Analysis of the situation

A successful surprise: higher education institutions had just about come to terms with e-learning - it had almost become routine. In any event, the debate surrounding it was anything but euphoric and impulsive. Now the debate on MOOCs has reached Europe and Germany relatively quickly from the USA and with the ensuing discussion, which constantly heads off in different directions, e-learning and the potential offered by the existing tools and applications are attracting renewed attention.

1.1 Definitions of MOOCs

The abbreviation MOOC which stands for "Massive Open Online Course" has become an ambiguous term, defying uniform definition, due to the different pioneers and users who each associate disparate experiences and goals with their own MOOC project. The interpretation of the letters of the acronym also varies. To illustrate the range of interpretations, here is a comparison of narrow and broad interpretations typically used.

Table 1: Narrow and broad definition of the term "MOOC"

Abbreviation of the term	Narrow interpretation	Broad interpretation
M for "Massive"	Unlimited number of participants	"Many" participants (starting at 100)
O for "Open"	Freely accessible to everyone at no charge	Openness in terms of learning goals, choice of subject and form of participation
O for "Online"	"Online learning": Online teaching only	"Blended learning": Mix of online and classroom teaching
C for "Course"	Course-like organisation	Emphasis on "Community", "Communication", "Collaboration"

Originally, "Massive" stood for very high numbers of participants in the magnitude of several thousands, or even tens of thousands. However, courses with more than 100 participants are now designated MOOCs in some interpretations.

"Open" is also interpreted in different ways: in a narrow interpretation, access to participants is allowed unconditionally and fees are not charged for registration, teaching materials or examinations. However,

when business models are established, fees are frequently charged for teaching materials, additional services and certificates. Broadly interpreted, Open can also express the openness of the learning goals, the choice of subject and the form of participation. There is also discussion as to whether MOOCs should be run with openly accessible content in the form of a Creative Commons Licence.

"Online" in the narrow interpretation refers to the course being held entirely online. For participants this means flexibility in terms of both geography and time within the period the course is available. As well as asynchronous teaching segments such as recordings and forums, there are also synchronous live sessions. Similarly to the concept of "blended e-learning", "blended MOOCs" have also emerged at which participants or groups are also physically present.

The term "course" refers to the course-like organisation with a fixed starting and completion date and structured into different subject units. There can be one or more teachers. Supervision and communications options can also be offered to supplement the course. With some types of MOOC, however, the C can also stand for the primary terms "(learning) community", "communication" or "collaboration".

1.2 The development into different MOOC types

MOOCs originally emerged from e-learning which has existed from the end of the 1990s. From around 2002, this was given new impetus by the concept of open educational resources, i.e. freely available learning and teaching materials and by the Web 2.0 concept which started to develop from 2003. Subsequently, the progress made in devices and networks made it possible for courses to expand and to deliver teaching to several tens of thousands of students in a single learning environment.

The first MOOC is considered to be the open online course run by the Canadian e-learning experts Stephen Downes and George Siemens in 2008 on "Connectivism and Connective Knowledge" (CCK08). In line with the content, the format of the course was connectivistic: the participants set their own learning targets and contributed content through blogs,

RSS and so on. Coined by Dave Cormier, the term MOOC referred to this original form for which Downes has since proposed the term "cMOOC". In 2009, Salman Khan founded the Khan Academy which provides video tutorials for students and tools for teachers.

At the end of 2011, for the first time, three IT courses at Stanford University were offered as open online courses. They were designed to be instructional and consisted of short video sequences alternating with multiple choice questions. These first courses were attended by 90,000 people, and subsequent courses by 160,000 people. Such high participation numbers garnered these MOOCs the designation "xMOOCs"[7] for "extended" MOOCs. Sebastian Thrun then founded Udacity, a for-profit company. In 2012, other Stanford professors established "Coursera" another for-profit organisation. At almost the same time, MIT and Harvard University launched the non-for-profit organisation "edX". All of these new companies concentrate on MOOCs as a business enterprise.

In German-speaking countries, cMOOCs have been held since 2011, initially on subjects closely related to education, such as "OPCO 11 on the Future of Learning"[8], "OPCO 12"[9] on trends in e-teaching and COER 13[10] on open resources for education. "Extended", i.e. xMOOCs, have been developed and offered from 2012 at the Hasso Plattner Institute in cooperation with SAP and by "imcAG" at the University of Saarland in cooperation with other German universities. A further development of the xMOOC concept in 2013 was the "Think Tank Cities" online course with Daniel Libeskind from the Digital School of Leuphana. Some other German universities offering xMOOCs are the FernUniversität [distance learning university] in Hagen, the two universities in Munich and companies or joint ventures such as "iversity", "fkmedien", "MMC" and "SOOC". In 2013, the Stifterverband in Germany together with iversity initiated the "MOOC Production Fellowship" which found great resonance among university lecturers. 250 concepts for MOOCs were submitted. The ten winners each received €25,000 with which to produce and run a MOOC.

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[7] However, the term "xMOOCs" has recently been used at Harvard University for "external" MOOCs.
[8] http://blog.studiumdigitale.uni-frankfurt.de/opco11/.
[9] http://opco12.de.
[10] http://www.coer13.de/news.html.

Due to this development, different types of MOOC have now emerged. They are dynamic with fluid boundaries. They can also function as components to be combined with other types[11].

Table 2: Different types of MOOC

Acronym	Full name	Description
cMOOC	"Connectivistic/ constructivistic" MOOC	⇨ Similar to a seminar or a colloquium
xMOOC	"Extended" MOOC	⇨ Similar to a lecture
bMOOC	"Blended" MOOC	⇨ Combination of classroom format with an open course
smOOC	"Small" OOC	⇨ Similar to short, customised (lifelong learning) seminars, colloquia
SPOC	"Small private online course"	⇨ As above, but not open

"Connectivistic/constructivistic MOOCs" are based on an educational approach called "connectivism"[12]. whereby self-organising learners use all the tools available in Web 2.0 to communicate. This results in self-determined, connected learning processes. "Facilitators" coordinate teaching units and summarise them. This format is close to a conventional seminar or colloquium.

"xMOOC" stands for "extended" MOOC. Some xMOOCs have been attended by as many as 220,000 people. Such a large number of participants makes them the focus of extraordinary media interest. xMOOCs consist primarily of video sequences followed by multiple choice questions. They thus have a format similar to that of a conventional lecture.

"Blended" MOOCs - bMOOCs - can be manifestations of xMOOCs and of cMOOCs, as the virtual format is linked to a classroom format. bMOOCs are often associated with the concept of the "flipped classroom", whereby content is acquired virtually and separately and the knowledge obtained is explored in more detail or applied in exercises in the physical presence of others. bMOOCs can take another form where the online

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[11] Subject to legal considerations (see 8. Legal Issues).
[12] See George Siemens, Connectivism: A Learning Theory for the Digital Age, 12 December 2004.

course is open to everyone and the extended blended learning version is available to students registered at a university.

"smOOCs" stands for "small MOOCs". This format puts the participants' individual characteristics centre stage and tries to approximate the advantages of face-to-face learning in terms of intimacy, trust, support and security. A close relationship between novices and experts is deliberately encouraged. Due to the individual components this format is particularly suitable for working on art subjects and for lifelong learning.

Problem-oriented "pMOOCs" and dedicated "dMOOCs", which are open to a specific target group, are currently being trialled.[13] It remains to be seen to what extent this format establishes itself as an independent type, and particularly how they will be distinguished from "cMOOCs".

There is also the concept of the "small private online course" or "SPOC" which can be seen as an evolutionary development of traditional e-learning. The "TORQUE" (Tiny, Open-with-Restrictions courses focused on QUality and Effectiveness) concept of ETH Zurich is similar.

There are also programmes which combine different formats. For example, like a Russian doll, a MOOC can contain a SPOC which can contain classroom teaching. This nested approach allows the cost to be graded.

Many MOOC designations signify enhanced concepts of blended or e-learning. On the other hand, it is claimed for xMOOCs in particular that they open up completely new dimensions in virtual learning and are therefore the focus of public interest. The discussion in this chapter refers therefore mainly to xMOOCs.

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[13] Jun.-Prof. Dr. Friederike Siller, U Mainz et al.

1.3   Participants

1.3.1   Heterogeneity and diversity

The heterogeneity of the learning group is a fundamental problem in every teaching format. However, it applies particularly to open teaching programmes and very specifically to MOOCs. The participants are non-students, first-year students, students nearing the end of their courses and graduates. There are various tools with which to meet the requirements of all these heterogeneous groups: firstly, a survey of the learning targets can help to classify the participants into homogeneous or diversified groups and designate concepts for the appropriate teaching methods. In homogeneous or diversified learning groups, the option of self-management, through peer-learning for example, can be used.

Another approach focuses on the options for scaling the content: teaching content is produced for different levels of knowledge or additional tasks and in-depth modules are offered as options. Learning concepts and the appropriate learning programmes are developed for adaptive learning processes and individual learning pathways.

However, diversity is also an opportunity for education and particularly for the sciences. Along with the usual dimensions - culture, age, gender, sexual orientation, disability, religion and world view - different educational qualifications and career experience are particularly relevant to MOOCs. Diversity allows a change of perspective which enriches academic learning and research. Due to their open character, MOOCs are particularly suitable for enhancing the potential of diversity.

1.3.2 Participant progress

Initial, currently empirical findings[14] on MOOC participant progress indicate overall that although participant numbers vary widely, from 95 to 230,000, a drop-out rate of around 90% is reported for almost all MOOCs. This high figure accumulates in different phases.

In the initial phase of a MOOC, a drop-in problem usually becomes apparent: "Window shoppers", who have been prompted to register primarily by curiosity, opt out as soon as they reach the first exercise on the content. This group can constitute up to 60% of registrations. The "genuine" drop out of initially active participants amounts to 75%. So if one takes the number of initially active participants, the rate at which they complete the course is around 25%. In absolute figures, this can represent as many as 20,000 graduates.

The drop-out rate for smOOCs or cMOOCs may be substantially lower, as many of the participants might have been working in the area for some time and to a certain extent are themselves experts.

1.4   Integration into a degree course

As has been shown, many MOOC users are not currently traditional students. In this respect, most MOOCs do not compete directly with higher education courses. However, if a MOOC is to form part of a degree course, the standards of teaching, quality assurance, examinations, the documentation of performance, certification and the recognition of grades must be taken into account.

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[14] University of Edinburgh: Report on 6 MOOCs http://hdl.handle.net/1842/6683, 10.5.2013, Universty of Amsterdam: Report on 1 MOOC http://gsc.uva.nl/news-events/content/2013/05/successful-communication-science-mooc-to-be-continued.html, 16.5.2013; Overview of 41 MOOCs held worldwide (Katy Jordan: http://www.katyjordan.com/MOOC-project.html, Dated 12.6.14); OpenCourse 2012 Anne Thilosen: "Trends im E-Teaching – der Horizon Report unter der Lupe" [Trends in e-teaching – a closer look at the Horizon Report] (OPCO12) – summarised, 14.2.2013, not published.

1.4.1 Teaching and didactics

Some xMOOCs in particular have been criticised for poor teaching. This is seen in the practice of merely filming lectures, in making written teaching material available only in the form of PDFs on the Internet, in unmoderated discussion forums and in quizzes following each piece of reading. The critics' view is that these forms of teaching are based on a largely obsolete concept of teaching via programmed instruction.[15]

There is potential for the development of innovative teaching concepts. These include interactive formats, graduated, individually scalable quizzes with feedback, transparency and experimental and stimulating competitive character with gamification. Gamification has on the one hand the potential to increase motivation and improve learning success; however, this form of entertainment can result in less reflection and, in extreme cases, in manipulation of the learner.

Approaches within blended learning try to combine the advantages of virtual and traditional face-to-face teaching in MOOCs, by providing real mentors for students, for example. One particular form of blending learning is the concept of the "flipped classroom". Students use MOOCs to learn independently and the content is then examined in more detail in a face-to-face scenario. Learners can also be offered the opportunity to meet physically in small groups to work with MOOCs.[16] There is a new project which combines MOOCs and a text book on the screen in front of which four or five learners sit.[17] These forms of blended learning permit a high level of individualisation to balance out mass teaching.

1.4.2 Quality assurance

A discussion of quality assurance must distinguish between educational and academic quality assurance. Quality assurance for the teaching of MOOCs can be guided by e-learning quality criteria, which relate to the

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[15] See inter alia Rolf Schulmeister: Der Beginn und das Ende von OPEN. Chronologie der MOOC-Entwicklung, in: idem. (Ed.) MOOCs – Massive Open Online Courses. Offene Bildung oder Geschäftsmodell? [Massive Open Online Courses. Open education or business model?], 2013, p. 30 et seq.

[16] MOOCollab (University of Lausanne) http://chili.epfl.ch/moocollab.

[17] BOOCs (University of Lausanne) http://chili.epfl.ch/boocs.

content or the correctness, the planning of the course, the usability and the design of the media.

Academic quality assurance is the responsibility of the professors – as it is in face-to-face teaching. Furthermore, quality can be ensured by mentors or tutors and by peer review. Peer review can be supplemented with group-to-group review, whereby the potentially easy access can encourage groups to develop both a constructive and a destructive dynamic. Multiple choice tests or quizzes can also be quality assurance tools.

1.4.3   Examinations and the documentation of performance
The challenges presented by examinations in the MOOC's framework are authentication and grading.

Examinations where the examinees are physically present at the university and take the examination at the computer do not present a problem for authentication. These classroom examinations can also be run on behalf of the universities by external companies. However, the MOOC characteristic of independence in terms of geography and time is lost here. Conceivable alternatives are online examinations aided by the technical verification of identity. Coursera, for example, is developing a "Signature Track" for authentication in which identification is made by means of the candidate's individual typing rhythm on the keyboard. Given that in Germany the legal opinion of the administrative courts is decisive in examination issues, online examinations do not yet appear to be legally incontestable. Consideration is therefore being given to the construction of a network of examination spaces by the universities.[18]

The assessment issue is particularly acute with xMOOCs. The following approaches to providing assessments for very large numbers of participants are currently under discussion. Some are very controversial including self-grading, for which the participants must be guided and supervised. Guidance is also necessary for peer grading. Initial experience with peer grading indicates that it produces reliable results in terms of the

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[18] One possible model is the examination network of the FernUniversity (distance-learning university) in Hagen.

ranking of examination performance. However, the full marking spectrum is usually not fully utilised: typically there is a concentration of mid-range marks. The biggest problem with peer grading is in data protection. Even with blind grading, it is possible to deduce the identity of the examination candidate and the peer. Regarding these innovative assessment procedures, it is doubtful whether the administrative courts in Germany will accept them as equivalent grading mechanisms because of the risk of manipulation. They may therefore be more suitable for providing qualitative feedback.

The assessment or grading of assignments undertaken in the course of a MOOC is less problematic. In principle, the assurance of the person handing in the work that it is their own is sufficient. Whether the examination officials need to be employed by the students' university and MOOC operators can "buy in" third-party markers must be evaluated using the examination regulations.

1.4.4 Certification

One form of certification in MOOCs are badges which show that attendance at the MOOC has been successful. Some badges do more than just confirm attendance at the course and try to evaluate the quality of the participation, thus serving to document the knowledge acquired. Participants can, for example, create a badge profile with their MOOC contributions and assign them different levels as specified by the organiser such as "Commentator" (badge level 2) or "Curator" (badge level 3). This assignment is monitored with random checks by the organisers.[19]

1.4.5 Recognition of credits

If xMOOCs, for example, are embedded in the curriculum of a degree programme and replace lectures or xMOOCs are used instead of seminars, the question of awarding credits arises. As long as students do not feel that they can be awarded ECTS credits, few will attend MOOCs. Recognition procedures or guidelines need to be developed in this respect.

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[19] See "OPCO 12", http://opco12.de.

If a MOOC offered as part of a university's degree programme is completed successfully, the MOOC is a teaching format for an established part of the curriculum. Recognition of the grades attained by the student enrolled for this degree programme would probably be unproblematic. For students who are enrolled at a different university or who switch degree programmes, the same conditions apply as to traditional classes. Under the Lisbon Recognition Convention, the burden of proof lies with the university.[20] However, the reversal of the burden of proof does not apply to recognition of modules which are not taken at universities. These regulations do not affect admission to the degree course.

With the Bologna Process, the opening of the universities and freedom of choice in the education system have become increasingly relevant. Against this background, there are endeavours to develop standardised procedures and regulations for the recognition of achievements outside of universities. MOOCs represent non-formal education for most participants. Matriculation at a university is not mandatory. Individual recognition procedures are required for them, unless the MOOC is recognised wholesale by the responsible bodies as an equivalent achievement for this group of people. This seems unlikely so far. There remains the option of individual recognition in accordance with the rules governing knowledge and skills acquired outside of university. Factors such as ECTS credits and the integration of examinations in universities could be instrumental in such procedures, however, the decision on recognition must be taken separately by each university. If the number of MOOCs were to rise, there would be a need for institutional and legal regulation – also so that false expectations regarding their formal recognition do not arise.

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[20] Fundamentally, the University Committee of the Standing Conference of the Ministers of Education and Cultural Affairs of the Federal States of the Federal Republic of Germany (KMK) states that "the mutual recognition of modules when students change university or degree course in accordance with the provisions of the Lisbon Recognition Convention applies equally to modules taken at universities in Germany and in other countries." Resolution passed by the University Committee of the KMK on 13/14 December 2012 (in German only).

1.5 Resources

The answer to the question of the monetary cost of producing a MOOC ranges from €25,000 to €500,000. This disparity is partly explained by the different demands that providers make of MOOCs. The amount also depends on whether the university has its own internal infrastructure and service providers for producing MOOCs, which are often not included in the cost calculation. The expenditure, particularly for xMOOCs, is driven by three different factors:

- Platform (fixed costs, variable costs of support)
  A content management system (CMS) or learning management system (LMS) for registering the participants, publishing the content and moderating the courses is required. For most MOOC concepts, the CMS must offer a sophisticated video management system and the effective integration of internal and external social media elements such as forums, blogs, chats, feeds, tweets and video conferences (Facebook, Twitter, Skype, blogs and so on). Given the high cost to the universities of developing their own platforms, various private and commercial providers take the opportunity to make their platform available to the higher education institutions either free of charge or for a fixed fee for hosting the MOOCs, depending on the business model in question. The university may be faced with costs of varying amounts for consulting the provider on the technology or on teaching.

- Content (fixed costs)
  The video and lecture material available to the course participants must be digitalised and made MOOC-compliant. As a rule, the typical length of a lecture is avoided, with videos lasting five to ten minutes instead. Generally speaking, this requires dedicated technology and appropriately qualified personnel; media training for inexperienced university teachers is a key factor in the quality of the product. The major MOOC platforms usually offer tips and assistance in this area. Copyright and licence legislation must be taken into consideration.

- Teaching capacity (variable costs, depending on number of participants)

Depending on the teaching method and the examination procedure chosen (e.g. multiple choice versus submission of essays), sufficient staff to facilitate the course, manage the content, and supervise working groups, given the number of participants must be included in the calculation. Technical support is included as part of the service offered by professional platform providers.

The production of a MOOC can be divided into four clearly separate phases which can each be allocated a certain amount of time and money (in brackets):

- Design phase (1-2 months/5%)
  Comparable with the design of a face-to-face teaching unit, such as a series of lectures with a seminar. Enquiries and scheduling with several teachers and planning for video production require additional costs. Teachers with media experience otherwise complete this phase alone or in small working groups.

- Production phase (2-6 months/35%)
  Scripting, recording and post-processing of the videos by qualified staff with suitable technology, ideally in a (basic) studio environment. Other materials (reading, exercise sheets, handouts and so on) must be digitalised and prepared. The completed teaching materials are entered in the CMS and tested. Simultaneously, marketing activities, particularly via social media, promote the course. Capacity and milestones depending on the number of registrations are planned for the course.

- Teaching phase (1-3 months/45%)
  MOOCs are typically not as long as a semester; in exceptional cases, they might take three months. MOOCs are usually broken down into sequential tasks or examination cycles so that the participants must produce proof of their knowledge or achievement at certain points in time, either alone or in a working group. The appropriate capacity for teaching, or more accurately facilitating the course and for the supervision of the working groups by (student) mentors depends a great deal on the absolute number of participants which experience indi-

cates over the duration of the course falls to around 10-20% of those who originally registered.

- Evaluation phase (1-3 months/10%)
  To date, given the lack of mandatory benchmarks and transparent achievement on the part of individuals, attendance certificates (pass/fail) are awarded instead of conventional grades. On the basis of the hours of work done however, ECTS equivalents can be certified in the same way as for exchange students. Fees are normally charged for verifying identity, marking work and producing certificates. Furthermore, there are opportunities to analyse learning progress, survey participant satisfaction and produce statistics (learning analytics).

Note that videos are not essential, especially not for cMOOCs. Nevertheless these also entail considerable expenses for their production and operation, making them comparatively labour and therefore resource-intensive.

1.6   Business models

Financing or refinancing of MOOCs is essentially considered in four ways: participant financing, financing from external donors, working with companies or financing through additional courses.

Because tuition fees are not charged in Germany, obligatory MOOCs which are integrated in the undergraduate degree courses are free of charge, at least to individual students enrolled at the university running them. Where this is not the case, the course can be financed with participant subscriptions (such as fees for the period and attendance on a certain number of courses), or with voluntary course fees (fixed or optional amounts/donations) or by charging for publication on the learning platform. Fees can be charged for attendant features; additional services might be payable in advance or optional additions might be made during participation. It might also be advisable to take into account that because of the drop-out rate, which is as a rule very high, variable costs may arise (such as for the provision of technical or supervisory staff)

which it might not be possible to cover fully with the business model of financing from the participants. Other options may be:

- Chargeable advanced courses
  (basic course free, further courses must be paid for)
- Chargeable content
  (access to learning environment or materials; companies for internal career development)
- Chargeable supervision
  (personal feedback, coaching, advisory services)
- Chargeable certification
  (certificate, examination in an examination room, individual feedback on a test or essay)

The following sources of third-party financing are under discussion:

- State and other public service funders
  (e.g. for university marketing: MOOC participants are notified about degree programmes and state aid)
- Advertising
  (e.g. with advertising banners)
- Sponsoring
  (by companies for whom the MOOCs are relevant)
- "Corporate Social Responsibility CSR"
  (employer branding)
- Crowd funding
  (through the Internet)

Start-up funding with venture capital, like Udacity for example, is also possible.

With respect to refinancing, some platform operators attempt to license their courses to other universities or even to whole countries (such as China or Qatar). MOOCs can also be financed in collaboration with companies. MOOCs produced by universities can act as marketing tools for private companies who offer follow-on MOOCs for people in employ-

ment.[21] It is also possible that the companies will finance MOOCs if they obtain learner data to use in the recruitment of potential employees in return. If they give their consent, participants can also receive job offers from these paying companies. However, passing on metadata continues to be at odds with the personal rights of the participants. The standard approach for all the major platforms is that a company says that it is looking for candidates with a certain profile. The platform operators contact the users who have this profile and ask them if they may introduce them to a representative of the company.

Finally, private service providers can also generate income with commissions for the production and the operation of MOOCs instead of collecting fees from the participants. This relates to chargeable support for the production of MOOCs or chargeable use of technical infrastructure for running and hosting MOOCs.

1.7   Legal issues

Legal issues associated with MOOCs arise in connection with legislation governing copyright, data protection, state aid, staffing, public sector employment and examinations. There are two key aspects in the legal evaluation of MOOCs: one aspect relates to the target group and consists of the difference between "students" (internal) versus the "general public" (external). The other arises from the contradiction between "cost-free" and "chargeable". As already discussed, the definition of these terms is blurred where MOOCs are concerned, so that it is difficult to find a clear legal classification.

The premise of the German legislation governing **copyright** is that it remains with the creating individual but usage rights can be transferred to others. The rights of university employees constitute a special configuration of these usage rights. A privilege enjoyed by university teachers ensures that the usage rights fundamentally remain with the independent researchers and teachers. If the universities wish to secure the rights to use the MOOCs themselves, they must enter into a contract with the

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[21] such as IMC Open Course World http://www.opencourseworld.de.

originator. If one or more universities choose this approach, it is recommended that these contracts be standardised. As MOOCs can be evaluated in a similar way to text books, it can be construed that universities assume ownership of them. The decision whether to assume ownership is a question of higher education policy.

In the context of copyright law, it must also be noted that subjects in a video hold the rights to their own image and their own voice. Permission must be obtained from anyone concerned (the keyword here is "model contract"). There are existing legal guidelines to the rights to other images and voices.[22]

Section 52a UrhG (German Copyright Act) is applicable to running MOOCs, and also provides for payment to copyright holders. The VG-Wort copyright collecting society and the federal states are at variance on the compensation regulations. A closed user group is decisive for the applicability of Section 52a UrhG. This must be guaranteed with registration and passwords. The aspect of a "specifically limited circle of those taking part in the instruction" also prevents the make-up of the course changing substantially after the registration phase. The number of users on the other hand seems immaterial, provided it is a specifically limited circle of those taking part in the training. It is also important that the course must be for non-commercial use. Legal assessment becomes problematic when use is partly commercial or indirectly commercial. A commercial environment is decisive for the interpretation in this case. Section 52a UrhG does not apply under these circumstances.

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[22] See Kreutzer, Till (2009): Rechtsfragen bei E-Learning [Legal Issues in E-learning], http://epub.sub.uni-hamburg.de/epub/volltexte/2010/5096/pdf/Leitfaden_E_Learning_und_Recht_creativecommons_MMKH.pdf; idem. (2013): Open Educational Resources (OER), Open-Content und Urheberrecht [Open Content and Copyright], http://www.pedocs.de/volltexte/2013/8008/pdf/Kreutzer_2013_OER_Recht.pdf; see also Schallaböck, Jan: Ausgewählte Rechtsfragen bei MOOCs, Vortrag im Rahmen der CI 2013/ eLearning [Selected Legal Questions Concerning MOOCs, lecture in CI 2013/eLearning] http://lecture2go.uni-hamburg.de/konferenzen/-/k/15568; on CC licences, see Klimpel, Paul (2012): Folgen, Risiken und Nebenwirkungen der Bedingung "nicht-kommerziell – NC" [Consequences, risks and secondary effects of the 'non-commercial' condition], http://irights.info/userfiles/CC-NC_Leitfaden_web.pdf; and also Kreutzer, Till (2011): Open Content Lizenzen [Open Content Licences], http://www.unesco.de/fileadmin/medien/Dokumente/Kommunikation/DUK_opencontent_FINAL.pdf.

There are two situations to distinguish where **data protection** is concerned: If the university's own students are participating, the university acts like an official authority and must meet the relevant requirements in public law. Where the course is delivered to third parties, general data protection provisions apply. In principle, users must give statements of informed consent. It is recommended that the data protection officers at universities and for the federal states are involved at an early stage. In any event, lawyers should review a pilot project.

Using learning analytics on fully anonymous data is not a problem. When data has been pseudonymised for linking purposes, this is possible under certain circumstances. As a rule, knowledge of pseudonymised data is sufficient to allow users to be supervised or advised. Binding individual supervision with real names is only possible if they are not stored. In this context, readers should refer to the new EU data protection regulation which was passed in 2014. It would be helpful if the universities were to draw up codes of practice on self-regulation in this respect.

State aid legislation does not distinguish between MOOCs and other courses. If participants pay for the course, the university is evaluated as a company in accordance with the market principles of the EU state aid legislation. As a rule, a full cost accounting exercise is required to determine appropriate prices. If it is clear whether third party income will be generated, such as for platform operators, it is also possible to make a payment to the universities subsequently. If the course is not paid for, it must be reviewed to determine its appropriateness for the mandate of the university.

There are two interpretations of the issue of the impact on **capacity legislation** when running MOOCs at German universities. In principle, increasing the capacity in terms of what is offered, that is, personnel and material resources, results in a higher number of places for students, provided there are no applicable legal exemptions. There is not a problem under the capacity legislation, as long as the MOOC in question is offered as a supplementary course by the university and is not integrated in the normal courses offered, provided there are no changes to the parameters under the capacity legislation (teaching load and the *Curricu-*

larnormwert which is used to determine the number of students that a
university - based on its number of academic staff - has to admit for
degree programmes). However, if the MOOCs become a part of degree
courses in the future, the question arises as how to deal with the actually
available capacity. This would also be linked to the question of whether,
if it is only possible to admit students to the MOOC section of the degree
programme, partial admission is possible or whether the admission ca-
pacity for the whole course should relate to the admission numbers for
the face-to-face section. Other questions to which no legal solution has
yet been found are how the staff capacity involved in producing the
MOOC or which is released when a teaching commitment is replaced
with a MOOC should be dealt with.

Challenges surrounding the **public sector employment legislation** also
arise from the capacity legislation. This firstly concerns the teaching load.
The teaching load directives of the federal states must show clearly
whether the production or running of a MOOC can be considered part of
the teaching load or whether it is possible to reduce the teaching com-
mitment for the MOOC activities. The preceding decision as to whether
running MOOCs should be a primary or secondary activity, should be a
matter of university policy. If MOOC activities are approved as a second-
ary activity, the university employees have a duty of loyalty which is coun-
ter to offers from the competition. It appears that it would be advisable
to adopt a generous attitude to approving secondary activities but that
they should be easy to terminate, so that no damage is done to the uni-
versity.

Regarding **examination legislation**, it should be ensured where MOOCs
are concerned that examinations test individual performance, with the
aim of determining whether the candidate taking the examination has
achieved the learning targets for a particular section of their course. It is
therefore necessary to put in place technical precautions which identify
the candidate beyond all doubt, without violating other norms, such as
that of data protection.

1.8   Digression: EU and open educational resources

Because MOOCs are often associated with open educational resources (OER) in the public debate, a look at OER from the perspective of the EU would be helpful to provide some delineation at this point.

The EU Commission intends its "Opening Up Education"[23] initiative to deliver a huge amount of funding to OER to meet the approaching demands of the European education market. The high increase in the number of students anticipated in Europe is demanding changes to schools and universities. Traditional teaching methods need to be overhauled, face-to-face and online teaching must be combined and access to education must be more flexible. The Commission views open educational resources as one way to meet the challenges these changes represent.

OER are, generally speaking, means with which to provide "free" teaching and learning materials. They are characterised by the four "R"s: reuse (the right to use again in an unchanged form), revise (the right to modify and adapt), remix (the right to combine with new content) and redistribute (the right to further distribution and shared use). The scope and nature of these rights are regulated with Creative Common Licences.

The use of MOOCs – particularly xMOOCs offered by profit-making companies – is frequently subject to other criteria. Equating MOOCs and OER causes distortions in both the far-reaching options for utilising OER, the broad spectrum of MOOCs and the different meanings of "O" as in "open" in this designation. This causes problems in terms of the legal framework and the provision of resources for OER and MOOCs.

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[23] From 25.09.2013, http://www.openeducationeuropa.eu/de/initiative.

2.   Possible applications or application scenarios

2.1   Reasons for creating MOOCs

The reasons for creating a MOOC can be expressed at different levels. At the level of the individual, according to statements from teachers, it is firstly an intrinsic motivation: "MOOCs are fun". This might be cited alongside interest in specific research or the need to be more visible as a teacher.

At an institutional level, the instrumental motives dominate. MOOCs can be used for marketing, to improve a reputation or to extend a portfolio. In some cases, particularly in public-private partnerships (see business models), the university has a commercial interest. It is often stated that using MOOCs creates better unity between research and teaching or raises the status and therefore the quality of teaching. However, it is not to be expected that universities use MOOCs because they want to save money.

At the macro level of university and education policy, MOOCs are associated with various fields of action and approaches to solutions. As addressed to some extent in Chapter 1, this holds true for the positioning of the universities or the German university system, for access for non-traditional students, for the ability to combine family and career with taking advantage of education offered by the universities, for the internationalisation of universities, for minor subjects and for encouraging interdisciplinarity in teaching. The following sample applications or application scenarios are based primarily on institutional and higher education policy.

2.2   Examples

Analysis of the following examples shows some differences between them in various respects: where they are used, their formats and target groups. For illustrative reasons, it is not possible to differentiate fully using these dimensions. However, where possible the following scenarios are classified according to whether they are conceivable before, during or

after studying. It is however possible to pursue several goals at the same time with MOOCs.

2.2.1 Marketing

Regardless of when they are used in education, MOOCs also have a function as extremely important marketing tools which allow universities to communicate with distant and fragmented target groups that lack a culture of education. Firstly, appropriate publicity for teaching and research-based content offered by public institutions is very distinct from the commercial strategies of product marketing. Secondly, it is possible for strong loyalties to develop between MOOC participants both with their teachers and the institution and towards (local) course participants. Thirdly, academic values such as quality benchmarks, diversity, discussion culture, pluralism, supervision etc. are conveyed through the process and therefore establish an identity. University marketing can therefore obtain as much direct benefit from these virtual teaching formats as from other university activities based on relationship marketing. It is possible to achieve a rapid impact on the international reputation of the teaching and supervision offered at the university for a relatively low price.

MOOCs are a way to address the extremely fragmented but usually very technology-friendly target group of potential students directly. Indicators of successful academic performance have up to now been dominated by research (publications, citations, rankings, third-party funding, research prizes etc.) and limit themselves otherwise to location marketing (campus, infrastructure, cultural and socio-geographic factors etc.). It is no secret that the university rankings currently available are mostly based on quantifiable factors and thus large institutions offering a wide range of subjects rank better and consequently, for many applicants to universities undergraduate teaching is confusing, difficult to assess and therefore reduced to a few quantitative indicators (supervision quota, course size, equipment per head etc.). Using digitalised mass lectures, subject priorities and the structure of course content suddenly become transparent and can be experienced by external observers for themselves.

From the point of view of marketing, MOOCs can also strengthen a university's profile for existing target groups as they permit participation in the substance and form of academic teaching and allow the participants to discover their quality with minimum obligation. MOOCs are therefore important tools for university marketing to address these groups and also to provide long-term relationship management throughout their education, from undergraduate teaching, post-graduate degree programmes, alumni activity and fund-raising, continuing education, lifelong learning and mentoring networks.

For medium-sized and small universities, MOOCs can make a valuable contribution towards the international visibility of their individual courses. High-achieving international students will enjoy and derive more benefit from courses accredited or certified according to European criteria in a safe, simpler personal environment instead of at a university catering for many tens of thousands of students in an unfamiliar highly-populated urban area they may perceive as unsafe. Low-cost, low-risk and highly regarded alternatives to comparable educational opportunities in English-speaking countries both in undergraduate teaching and for graduate courses and career development are therefore available outside the conurbations of Germany to students from Asia, Latin America and Africa. Furthermore, there is a growing number of European graduates and young professionals (in Poland, Spain and Ireland, for example) looking for (technical) language qualifications for the labour market in Germany on the one hand and further training in German companies with global operations on the other. The visibility of German universities for a global community of students and teachers can therefore exploit the cultural "location benefit" and achieve success with virtualised German language courses.

2.2.2   Threshold or transitional programmes

The range of MOOCs makes them suitable for use before or at the start of a degree course. There are a number of different target groups: firstly, general information about studying can be conveyed to anyone considering taking a degree. This can be offered in tandem with initial content and suitability tests (online self-assessment).

Secondly, it is conceivable that they could address non-traditional students specifically and link to general information, such as the possibility of studying without a traditional school leaver's qualification. In this context, information about access and admission to university and recognition of qualifications obtained during a career are of particular interest.

Thirdly, bridging courses can be offered in MOOC format to those interested in studying. This applies both to traditional and to non-traditional students. Typical subjects here are mathematics, English and German, where relevant.

A MOOC could conceivably be helpful in general studies, held before or during the first semester. Preparatory courses or courses on scientific methods could also be integrated in a course of this kind. It could be voluntary or mandatory for matriculation in a degree programme.

As well as these general options, other transitional courses aimed particularly at international students are possible: MOOCs can provide general information about studying in Germany. This includes types of university, admission to university, the cost of studying, exchange and funding programmes. Furthermore, an introduction to German (scientific) language could be offered. This might also teach writing, citing, researching as well as also intercultural and media skills. MOOCs can also be used to recruit potential early career researchers or managers. This applies particularly to Masters degree programmes and doctoral studies.

2.2.3   Standardised mass lectures

xMOOCs are options for standardised mass lectures used as part of a degree programme, particularly for introductory lectures in major subjects. To guarantee learning success, these MOOCs should integrate introductory and motivating elements and be linked to a supervised phase which works through the subject matter and examines it in greater depth. This may be through the traditional combination of lectures and tutorials or as part of the course itself or through the blended learning principle of the "flipped classroom" or "inverted teaching". The students

will thus initially study on their own with the MOOC and then examine the material in more depth with face-to-face groups. The accompanying face-to-face events are furthermore important because MOOCs can only take account of the growing heterogeneity of the student body to a certain extent.

MOOCs are resource-intensive and mass lectures particularly so: this relates mainly to the high cost of development and the operational IT costs. Even if the number of lecturers can be reduced after a certain time, large numbers of personnel are required for the accompanying face-to-face sessions. Furthermore, the content and the features will need to be updated as time goes on.

So far, no solution has been found to the problem of students refusing to take a MOOC, giving rise to the question of whether the university should offer at least teaching in a conventional form at the same time. This undertaking would be associated with additional costs. If MOOCs are to be offered for mass events to students in more than one department or even at more than one university, given the freedom-to-teach principle, the willingness to cooperate of the staff involved in each is key. The freedom to teach is also an obstruction to peer review in advance. The teaching is evaluated through the openness of the event itself and through any subsequent assessments. The guiding principle that all in all the diversity of teaching may not be impaired is crucial to the standardisation of introductory lectures.

2.2.4   Blended formats

MOOCs are often posited as an online substitute for face-to-face teaching. This interpretation falls short, because MOOCs also have great potential to change or supplement traditional face-to-face study at universities. MOOCs can be run in parallel for online and face-to-face students which implies pedagogic potential as well as logistical challenges.

From a pedagogical point of view, video lectures allow university teachers to rethink the organisation of their teaching. Initial feedback from university teachers at EPFL Lausanne leads to the conclusion that stu-

dents who have seen lecture videos are better prepared for exercises. Another positive effect is that university teachers participate in the revision exercises to help students with their problem solving. These pedagogical improvements generate costs. Interactive lectures and seminars require smaller rooms in which students can work in small groups and a larger number of qualified teachers to work with them. The presence of students on the campus allows the video lectures to be watched in small groups. Students can pause the video to discuss difficult aspects. They can work on quizzes and assignments together. Students benefit from this group work so that many make arrangements to watch the videos together.

Offering online and face-to-face lectures in parallel gives rise to organisational problems, the first being the synchronisation of schedules. The start and duration of terms can vary widely across the world which makes it difficult for one university to use the online courses from another to supplement their face-to-face teaching. The timing of MOOCs usually does not take account of public holidays and breaks between terms. Given a certain amount of flexibility it is possible to synchronise online and face-to-face lectures by starting the MOOCs slightly later in the term and giving students two rather than one week to complete their assignments.

Secondly, the integration of online assignments in a face-to-face course is not a trivial matter. The level of difficulty or the type of assignment is usually not suitable for both groups of participants. For example, face-to-face students have the option of solving practical problems which online students do not.

Particularly in natural science and engineering teaching units, students use laboratory equipment and devices to carry out experiments. However, under certain circumstances, it is possible to deliver these experiences with media. For example, the FernUniversität in Hagen has developed "real systems in a virtual laboratory" for teaching process management and control technology. EPFL Lausanne is working on an arrangement to allow experiments in flow mechanics. In this virtual lecture, students can control the flow of water remotely and measure its properties. The tech-

nical challenge is to allow simultaneous access to a limited number of technical facilities.

Mutual "peer assessments" give rise to legal questions, particularly concerning who has the authority to test knowledge with a view to the awarding of credit points.

2.2.5   Seminar-like options

cMOOCs are seminar-like and highly interactive which makes them suitable for use at the more advanced stages of a degree course. They are bound by the principles of constructivism and connectivism. This assumes that learners would like to and are able to design their learning for the most part themselves. Access to content and people is essential to allow them to do this. cMOOCs offer their participants content material and encourage intensive dialogue. In line with the principle of self-organisation, they allow the learners to choose which material they work on and to what extent. The learners also create material (such as their own blogs). These are referenced and used by the other participants and they develop them together. Collaboration tools such as wikis, blogs and forums are used frequently in cMOOCs.

Successful cMOOCs thrive on the active engagement and lively interest of their participants. An important part of learning is undertaken collaboratively. The participants are not assigned permanently to fixed learning groups, but depending on the topic seek out their own partners with whom to interact.

The concept of cMOOCs is not consistent with external performance assessment. Rather, it is for each learner to reflect independently on how much they have learned. Therefore, open badges are currently being tested to document learning activities, allowing learners to show their activities and products.

However, many of the cMOOCs held so far are self-referential in that they address subject areas such as collaboration, learning, MOOCs and so on. Because the learners are expected to show so much initiative on their

own, cMOOCs are less suitable for mandatory parts of a course. However, it is a format that can be interesting for lifelong learning. The highly active approach and engagement of the learners can make participation in a cMOOC a special experience, with the participant acting not as a passive recipient but as an active member of a knowledge community.

2.2.6 Minor subjects

With their reach, MOOCs are also useful for creating the necessary critical mass for "minor subjects" as part of a degree course. "Minor subjects" are usually cultural studies subjects which can be at risk at a given location particularly due to the teaching capacity required by "Bologna" and which involve small numbers of researchers, teachers, and students and receive little in the way of resources.

The long-tail phenomenon has an impact on minor subjects: with demand accumulated on the internet, niche options are also given an opportunity. In terms of the minor subjects, MOOCs can make a specific feature of the German university landscape visible and contribute to their internationalisation. The hallmarks of the minor subjects, such as interdisciplinarity, tendency to overview, networked thinking, communication ability and intercultural skills can be disseminated. It should be examined whether MOOCs for minor subjects should be created in cooperation with a service point to be set up to support and coordinate planning decisions (federal government funding initiative). A link between MOOCs and a map of minor subjects is also conceivable.

2.2.7 Interdisciplinary and transdisciplinary options

Interdisciplinary and transdisciplinary MOOCs can address students and other participants outside of the university. It is frequently stated that interdisciplinarity and transdisciplinarity are desirable for research projects and lectures but are realised less often than is liked. MOOCs can fulfil this requirement and go beyond it to help elevate the reach of the lecture series, a traditional university teaching format, to a global level.

Interdisciplinary teaching can be represented well with the aid of MOOCs in that teachers and external experts from different disciplines can talk and contribute teaching modules on their own areas.

An example of an interdisciplinary MOOC is "The Future of Storytelling" at the University of Applied Sciences at Potsdam[24] which has been offered on the www.iversity.org MOOC platform since October 2013. It concerns how knowledge is conveyed through narrative structure in the digital age. Writers, film-makers, developers of online role-playing games and media theorists appear as guest teachers in this MOOC and vividly illustrate the diversity of the topic and its practical relevance. It is attended by over 80,000 students from an extremely wide variety of backgrounds, as a survey by iversity has shown.

MOOCs are also suitable for transdisciplinary research and teaching in the form of a reflection of interdisciplinary issues. This is illustrated with the MOOC "The European Union in Global Governance"[25] which is presented by a group of professors from Italy, Germany and the Netherlands. Together, they discuss the role of the EU in the current world order, from the point of view of politics, law, the economy and the environment. Other research areas are addressed through interviews with scientists and politicians.

Some universities[26] and platforms such as e.teaching.org[27] already offer access to lecture series in the form of recordings, however, normally without opportunities for interaction. MOOC platforms will also be able to use the lecture series format in the future. Unlike in face-to-face teaching, it is easy to bring lecturers from different parts of the world and from subject areas of all kinds to take part in lectures, thus bridging great geographical distances. The "Oxford Debates"[28] are an example of the Anglo-Saxon tradition of public debate. They allow two speakers to debate a topic that has been set in advance and to address the arguments

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[24] https://iversity.org/courses/the-future-of-storytelling.
[25] https://iversity.org/courses/the-european-union-in-global-governance.
[26] See, for example, http://timms.uni-tuebingen.de.
[27] http://www.e-teaching.org/community/communityevents/ringvorlesung/.
[28] http://www.ox.ac.uk/oxford_debates/past_debates/index.html, (no longer available).

of the other in four videos each. Discussion formats like these are very suitable for delivery in the form of MOOCs.

2.2.8   Lifelong learning

MOOCs can have other uses in maintaining contact with alumni and in different forms of academic lifelong learning.

MOOCs can be used to stay in touch with alumni immediately after they have completed their studies. Using "Update MOOCs", universities or departments can provide news about developments at the institution and in the discipline. This strengthens the bond with the graduates and encourages their return, for example to begin a Masters course or a doctorate, to teach or to become a career researcher. It is also possible to make and cultivate contacts in business and politics through the alumni and potentially attract individual or institutional donors or funders. These "Update MOOCs" present a problem in that scientific developments, at any rate, are difficult to package concisely due to their diverse, complex and inconsistent nature.

Where academic lifelong learning is concerned, there are different configurations: formalised certificates and qualifications or informal knowledge acquisition.

cMOOCs are very suitable for informal knowledge gathering in lifelong learning. They allow working people to think about the particular challenges presented by their jobs and to develop their expertise in the company of others. With the cMOOC concept in particular, the participants are not just interested in education nor merely learners and recipients of knowledge: they actively construct and impart knowledge themselves. In the Open Course Workplace Learning (OCWL11), which was delivered in Tübingen in 2011, students attended a face-to-face seminar at the university which was viewed and explored by interested members of the public on the internet. The students prepared academic articles for the group of working people, who linked their practical experience with these articles and offered it to the students for discussion. Each group thus benefited from the expertise of the other. This was a form of blended

MOOC where the students' learning at the university (face-to-face) was supplemented by the practical experience of people in employment.

Formalised lifelong learning with certificates or qualifications can also be delivered by MOOCs. This form of "lifelong learning MOOC" is frequently associated with the opportunity to earn significant financial income. Standardised updates in the major subjects appear to be lucrative – certain areas of the law, particularly tax legislation, new business models and new medical knowledge and therapies. However these market segments offering lifelong learning of interest to people in employment are already occupied by private providers and/or scientific associations. If a university wishes to enter this market with MOOCs, there are problems under competition law, as indicated in 1.7., particularly in terms of EU state aid law.

There are fewer problems with competition law in areas which are of less commercial interest to private providers. This applies particularly to lifelong learning in the humanities, natural sciences and technology. In most cases, the latter can only be held at universities as they need some technical infrastructure. As shown in 2.2.4, in principle various media can be used in MOOCs to show experiments in the natural sciences or in engineering. However, the costs are high, so these lectures do not generally yield any income.

Within the framework of lifelong learning and its social mandate, the universities are increasingly facing the challenge of making special career development opportunities accessible to non-traditional students. Qualifications acquired by individuals in the course of their career and otherwise must be taken into account. Customised content with personalised advice on the initial steps, support and highly individualised learning pathways and formats are important. Virtual formats such as e-assessments, quizzes or online simulations can also be integrated for this target group particularly within the framework of a "blended learning" concept. However, the great importance of target-group specific supervision, particularly for non-traditional students, is difficult to reconcile with the "massive" aspect of an all-encompassing, purely virtual MOOC.

3.   Potential and problems

The following section assesses the potential and problems presented by MOOCs in no particular order of potential importance.

3.1   New formats

With the rapid turnover of learning units, MOOCs are continuing the development towards ever-shorter educational formats. This is a logical continuation of the study reform to a tiered system and the accompanying modularisation. The advantage of these shorter educational formats is that learning and study pathways can be more flexible. This has a particularly positive effect where opportunity costs are high, in certain family situations and when different levels of appetite for education need to be accommodated. A formal limit to this shortening is set by the structural specifications of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK) on modularisation which state that modules should come with at least five ECTS credits and as a rule end with an examination.[29] This provision must be adapted for the new options offered by virtual formats.

However, shorter formats mean that students must undertake more organisation during their undergraduate course. The disadvantage of these formats is that education is increasingly fragmented and broader contexts can perhaps no longer be conveyed. There is also the danger that the students are no longer sufficiently encouraged to read, understand and transfer more complex and more comprehensive material, particularly texts.

Regarding xMOOCs, it is also doubtful how far they contribute beyond conveying cognitive knowledge to developing skills and personality. These are better nurtured through face-to-face communication which is why the blended learning components are considered particularly important. cMOOCs on the other hand can be instrumental in encouraging

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[29] Outline specifications for the introduction of credit systems and the modularisation of degree programmes, Annex to the Joint Structural Specifications for the Accreditation of Bachelor and Masters Degree Programmes for the Federal States dated 04.02.2010 (only available in German).

learners to be self-reliant and to organise themselves. A distinction should be made between situations in which MOOCs represent a component in degree programmes which use a wide range of teaching formats and those in which MOOCs are the primary or even the only format. The dangers outlined above relate to the latter situation.

3.2   Potential for internationalisation

MOOCs can act as drivers of internationalisation and of the competitiveness of German universities. MOOCs are also linked to an international "democratisation of access to university education".[30]

MOOCs can be used to promote the international mobility of students. School pupils in other countries can be made aware of the courses available at German universities and, where relevant, be prepared for studying in Germany in terms of the subject matter and language learning. MOOCs can initiate and facilitate student exchanges to and from Germany.

Against the background of international competition, MOOCs are not only suitable for marketing opportunities for mobility but also for highlighting the profiles of institutions. German universities can use MOOCs to create an international profile and ideally to set new international standards as single entities or as a group with others with their teaching and research priorities. First and foremost, they should highlight the quality and diversity of universities in Germany. The tendency to offer English-language MOOCs for an international audience can however diminish cultural diversity in terms of the language and in other respects. It might be possible to offer virtual visits abroad instead of real visits. In some situations, this might be helpful if a student's personal circumstances would not permit a genuine stay abroad, in some cases however, it could have an undesirable effect.

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[30] See DAAD documents (not published): "Die Hochschule 2.0. Die Internationalisierung der deutschen Hochschulen im Zeichen virtueller Lehr- und Lernszenarien. Zentrale Erkenntnisse [The University 2.0. The Internationalisation of German Universities With Virtual Teaching and Learning Scenarios. Key Findings]" and "Die Hochschule 2.0. Die Internationalisierung der deutschen Hochschulen im Zeichen virtueller Lehr- und Lernszenarien. Handlungsempfehlungen [The University 2.0. The Internationalisation of German Universities With Virtual Teaching and Learning Scenarios. Recommendations for Action]", October 2013.

Even if the formulation "the democratisation of university access" is an exaggeration, to some extent MOOCs allow access to university for groups of people who would not normally go to university, even on an international scale. Cost-free MOOCs for non-traditional students or potential students should encourage more people to enter an academic career in some form or other outside of Germany. This can apply particularly to groups of people in many emerging and developing countries who do not have access to university education.

In this respect, the question arises of whether universities assume responsibility for development policy. If this is the case within the framework of general state funding programmes for development, one task could be to construct infrastructure for digital learning. This must allow for flexible architectures suitable for low bandwidths and also the potential for wireless networks. Universities can however pursue instrumental goals in these countries which go beyond general development policy. For these cases, MOOCs can help with the profiling described above, with conducting specific research and with finding and maintaining relationships with up-and-coming or currently suitable partners for research.

3.3 The challenge of self-regulation or swarm intelligence

In a course on the scale of a MOOC, learners cannot be directly supervised by lecturers. Instead, many MOOCs (both xMOOCs and cMOOCs) rely on the concept of self-regulation and swarm intelligence. Self-regulation requires learners to have many skills, such as the ability to motivate themselves to study, to consider their own learning method and subject it to critical review and to ask for help when necessary. Not all learners have these skills. Participants are expected to meet other criteria depending on the user groups and the nature of the MOOC (bridging courses, mandatory lectures or interest-driven participation). Learners with little ability to regulate themselves require more guidance with the teaching so that they can complete a course efficiently and with success. Courses which expect learners to be too independent increase the gulf between students with favourable or less favourable learning circumstances (see the next section).

xMOOCs in particular, with their large numbers of participants, offer however the option of recording and analysing their learning behaviour as it is ongoing, that is online. Automatic analysis of this data and the creation of profiles make it possible to identify learners with unfavourable learning behaviour and to offer them help tailored to their requirements. The technology can also control behaviour by not making content available until a certain level has been achieved. In this respect, a new area for research and development is establishing itself in association with MOOCs and big data: "learning analytics". It is still at an early stage, but will/should make it possible for MOOCs to be developed for very large numbers of people but made adaptable to the individual requirements of a heterogeneous audience.

However, MOOCs can also be adapted to a heterogeneous audience without this complex development. Large numbers of participants working on content at the same time and communicating creates a collaborative situation in which each participant is integrated into a social event and is given the feeling of being part of an extensive learning community. This leads to mutual motivation and help. When a course reaches a critical mass of participants, questions can be answered very quickly by peers, provided suitable communication platforms are provided. The mass regulates itself working jointly and simultaneously on learning content and individuals find niches (people, content or activities) which provide what they need. This is only possible, however if the number of participants is sufficiently large and the course conveys an atmosphere which integrates each learner in the communal event. That means the course must signal constantly to each learner learning individually and separately from the other participants what they are doing, how well they are doing it and what they have in common. This is conditional on learning at the same speed and using the same platform to communicate. Participants report that if an atmosphere like this can be created, the social situation and the involvement in the group is a very strong motivation to complete the MOOC successfully.

3.4   "Digital divide" within the groups of students and teachers

A key aspect of many forms of teaching which come under the heading of MOOC is that they ask participants to be highly motivated and that they have certain technical and communications skills – often referred to as "digital literacy". There is also a requirement that the technical pre-requisites are in place. However, with prices falling over recent years and initiatives to install more broadband connections, much progress has been made in this area. Using a computer is no longer an excluding factor for students, nor for the lifelong learning target group. This is all the more true because this potential problem can be addressed with an appropriately user-friendly design of the courses.

A much larger problem and one that is not diminishing on its own, is the motivation of the participants. This is primarily true if the MOOCs are intended to address a wide target group and if there is a wish to increase the number of students. A gap can arise between motivated and less motivated students with the increased deployment of MOOCs if the MOOCs are used in a different way: If MOOCs are offered as "optional additional courses", experience shows that they are more likely to be used by those who are committed to their studies while students who do not perform so well will not use them. If MOOCs are deployed in under-graduate and mandatory courses there is a danger that the greater ano-nymity widens the gap between the highly motivated and the less moti-vated students because social motivation does not kick in.

Even if the issue is more one of a "motivation divide", the effects of exist-ing differences in motivation tend to be exacerbated by increasing digi-talisation. The danger described here must be averted with an appropri-ately motivating design of the content, comprehensive supervision and appropriate organisational arrangements.

A discussion on MOOC design leads directly to the teachers and to the question of which teachers provide MOOCs and what this means to the teachers as a group. There is of course even without MOOCs a very broad spectrum of different forms of teaching and of media used in teaching. The question is whether the different types of MOOC are simply the addi-tion of new formats to the spectrum. If one hypothetically assumes that

there will be in the long term, in some areas at least, a shift in the significance of teaching formats or, as an extreme, even the replacement of some formats, the question arises of the effect this will have on teachers.

Very ambitious and successful MOOC projects can also have a deterrent effect on teachers and divide a group into MOOC enthusiasts and traditionalists. Broad use of MOOCs with less emphasis on single prestigious projects could remove any reservations.

In order to deploy MOOCs in a systematic and sustainable fashion, simplistic and incorrect myths such as "all teachers must become digital teachers" must be exploded. The objective might just be to enable all teachers to use those forms of teaching – including digital means – which appear from the point of view of teaching and of content to be appropriate and helpful and to support them in this use.

3.5   The role of platform operators and higher education institutions

Various start-ups offering a platform for MOOCs have been founded in the course of their realisation. Examples in America are Udacity and Coursera and in Germany OpenCourseWorld, openHPI and, notably, iversity. Through the funding competition "MOOC Production Fellowship: Lehren und Lernen im Web [Teaching and Learning on the Internet]" which it founded jointly with the Stifterverband in Germany, iversity has achieved great visibility. Initially, these new intermediaries in online teaching offered primarily a technical platform and expertise in the development and presentation of MOOCs. As the user base has grown, however, these organisations, which are generally commercial enterprises, have acquired another important asset: at the beginning of November 2013, just three weeks after the first courses started, iversity announced that user numbers had doubled to 220,000 students and in February came the news that short-term registrations were already just under 500,000. The reach of the established platforms in terms of registered users thus goes far beyond that of individual universities. On the other hand the universities strengthen the platforms, as intermediaries, by offering MOOCs on them. They are increasing in importance so rapidly

because potential students will search them first for MOOCs rather than turning to individual universities.

Co-branding currently encompasses the platform, the university and the lecturer. However the corporate design is that of the platform and the university occupies a less prominent position. In the current manifestation, the distribution of roles is significantly different from that of franchised study programmes or similar products. As a rule, the platforms not only have their own design but also their own rules and systems governing quality assurance and the preferred MOOC concepts.

The Virtuelle Hochschule Bayern [Virtual University of Bavaria] (www.vhb.org) shows that other role distributions are possible. It was founded over ten years ago as a joint venture and has deliberately declined to host courses itself and to push for standardisation of the courses. This means of course that the universities are easier for the students to identify as providers, but the high level of technical and conceptual heterogeneity makes it more difficult for students to familiarise themselves with the courses. Furthermore, the universities must undertake a great deal of development and updating work if they want to keep pace with advances in the technology.

The discussion of how, by which means and with which intermediaries MOOCs and xMOOCs in particular can be delivered in the most practical way must include consideration of the goals and the role that they will have in the future. The more important MOOCs are considered for the future of the universities, the more important this question will be, as potentially there can be significant shifts in the visibility and the roles of those involved. Joint ventures could be a solution as individual universities do not generally have the necessary reach, at least not for xMOOCs.

The implementation of MOOCs can also be conceived of in different ways: Universities can involve platform operators or realise MOOCs themselves or in groups with other universities.

3.6   Quality and diversity of teaching

The examples of applications described in Chapter 2 have shown that MOOCs can improve the quality and transparency of teaching. This applies particularly to cMOOCs which in this manifestation bring a completely new format to university teaching. The quality of teaching can also be improved with xMOOCs, but only if the virtual teaching is permanently moderated or at least monitored on a random selection basis. This applies to blogs and the award of badges, amongst other things. Furthermore, and this applies to xMOOCs and xMOOCs equally, it will only be possible to achieve an improvement in quality if the virtual is supplemented with supervised face-to-face teaching. The concepts of "blending learning" and the "flipped classroom" are particularly important in this scenario. This also means, however, that an improvement in quality with MOOCs is only possible with additional resources. MOOCs are therefore not instruments with which to save money. Providers of public funding should be left in no doubt of the fact that MOOCs are not suitable models with which to save on teaching costs. Indeed, merely filming lectures would even put the quality of the teaching at risk.

Nevertheless, in some places it is said that, particularly for introductory lectures in major subjects, savings could be made if the MOOCs could be re-used practically at no cost by a number of other faculties or universities. This view takes no account of the very high investment costs which puts the break-even threshold equally high. It is also ignores the ongoing cost of materials and personnel, operation and supervision and also of developing the content and technological features.

It would only be theoretically possible to recoup investment costs if a MOOC were to be used throughout the country. However, it follows that this would standardise the teaching which is inconsistent with the requirement for diversity. Taken to the extreme, widespread standardisation could even threaten to "McDonaldise" teaching. This also applies to introductory lectures in which basic knowledge is conveyed because particularly in the humanities and social sciences the wide diversity of approaches to teaching and research are also expressed in introductory lectures.

3.7   Necessity of positioning for higher education institutions

The need to make extensive use of MOOCs very rapidly is frequently justified with a reference to examples of digital revolutions in the past. For example, providers of digital services and products such as Amazon, eBay and iTunes changed the previous structures of the market so radically that traditional suppliers have been forced out. Are MOOCs a similarly disruptive innovation? Independently of this question, it is clear that there are factors that speed up and slow down the distribution of MOOCs. As shown above, digitalisation in general, shorter educational formats and the internationalisation of education are accelerating the distribution of MOOCs.

However, the fact that education is viewed in Germany first and foremost as a task to be undertaken by the state is acting as a brake. This fundamental social consensus is shared by the advocates of tuition fees which only cover a small part of the actual costs of studying. In line with this fundamental consensus, the sometimes considerable investment required to establish MOOCs at German universities must be made with finance from the state. Foundations and companies could also contribute as sponsors.

Alternatively, whether MOOCs could refinance themselves with compulsory fees might also be considered. This would firstly be counter to the principle of open access to universities inherent in MOOCs. Secondly few students in Germany would be willing to pay fees for MOOCs. Another alternative would be to resort to private investment funds or venture capital. These investors will expect a medium to long-term return from the invested capital. As demonstrated here, this prospect is uncertain.

The situation is therefore fundamentally different from that of the USA, where students take MOOCs, with their lower fees, to avoid the huge cost of a university place. German universities need therefore not fear that they are turning to MOOCs too late nor that they will be completely forced out of the education market if they pursue a different strategy. Nevertheless, the universities should look carefully at the existing digitalisation processes and identify the potential that they can use for them-

selves. No university will be able to avoid strategic positioning on digital-
isation for their own priorities and target groups.

3.8   Critical appraisal

The overwhelming majority of publications on the subject of MOOCs take
little account of the reality of university education. A popular pattern is to
present an unattractive picture of current university teaching, which is
given further impetus by an echo effect in the media. Examples of the
arguments used are

> *"It's education like off-the-peg suits: a mass market product.*
> *Degree courses, whether they are in physics or German, are*
> *offered in the same form, with the same seminars and lec-*
> *tures. The universities make it easy for themselves: One size*
> *fits all"* [31]

This negative framing is followed by a description of the benefits of
online courses and MOOCs in particular. This argument assumes several
things:

- extreme dissatisfaction with the existing organisation of university
  courses,
- that the complex academic structure can easily be replaced,
- a willingness to accept a permanently established selection of teach-
  ing units on the part of the students (individualised curricula).

Anyone welcoming this individualisation must also discuss the conse-
quences in an appropriate form. As a rule this does not happen: who
guarantees, for example, that converting available courses to "menus"
would guarantee equality of examination performance as an outcome?

The development in online courses and MOOCs in particular so far has
revealed quite different indicators:

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[31] Jörg Dräger, in: Die Zeit, 21/11/2013.

- MOOCs are expensive and still in short supply.
- The discussion has directed new attention to e-learning and created new initiatives in this area.
- However, the entry threshold into e-learning has now become even higher. The pioneers have come together again in the MOOC debate. A significant trickle-down effect has not yet been seen. There is no dispersal such as that familiar from diffusion research. While the acceptance of learning platforms is still being promoted at an everyday level in the universities, the avant garde is sitting in an express train that few passengers wish to board.
- It follows then that the gulf between those who promulgate and practise e-learning and those who would rather observe it and try it out occasionally is growing.

More importantly, however, it follows that the "mass" arguments skirt around reality. There are several reasons for this:

- It can already been seen that the experience of the USA cannot guarantee appropriate teaching and learning with a mass audience in an online context. The talk is now of SPOCs, small private online courses, rather than MOOCs.
- Initial experience gained by the FernUniversität in Hagen with two MOOCs has shown clearly that this production format cannot guarantee sustainability under the financial conditions currently prevailing at German universities. The time and personnel required for the production of a MOOC lecture are as a rule disproportionate to the return it delivers. Educational impetus will be adapted to the blended learning concept.
- Even more conclusive is that the discussion so far has been characterised by a strange paradox: most people who read an article on the subject of MOOCs believe that they are a substitute for a first degree. In fact, the target groups for this new approach are not made up primarily of students, but of people who wish to study again or who are looking for refresher courses.

4.   Final appraisals

4.1   Summary

Appraisals of MOOCs often yield ambivalent results as they present both potential and problems. The following juxtaposes the key potential and problems resulting from MOOCs.

The ambivalence of MOOCs is already expressed in the very heterogeneous background of the **participants**: this means a major challenge in designing practical educational concepts for such diversity. This same diversity of participant backgrounds also offers education and academia an opportunity for enrichment. **Participant pathways** in MOOCs can be viewed from different angles. The drop-out problem with a success rate of just 10% seems initially insurmountable. However, once the curious "window shoppers" have been eliminated, the absolute figures for students completing the course successfully is often higher than for conventional lectures.

There are opposing views on **didactics and teaching**. cMOOCs and blended MOOCs in particular often use innovative educational concepts. Some xMOOCs offer very poor teaching if they consist mainly of filmed lectures. The **supervision** required for the lectures can be provided by "peer learning". In some learning situations, lack of active support from teachers can be a problem. "Blended" formats meet this demand.

The problem of **authentication** for **examinations** can be solved in various ways, from face-to-face examinations to online authentication, with "Signature Track" for example. It is clear that legally incontestable identification of individuals is necessary so that credit points can be awarded. A network of examination locations could be set up for tests. Content can be **assessed** with self, peer or blind grading. However where this is the practice, the full range of grades is not usually used, there are data protection issues and manipulation cannot be excluded. Badges have been developed as a new form of **certification**. These are not very meaningful as a rule and require at least random testing. If MOOCs are to form part of a university course, the issue of **recognition** arises. In principle, it is possible for ECTS credits to be awarded for

MOOCs or for MOOCs to be recognised as non-formal education. Despite the high expectations of the participants, there is often no reliable entitlement, as there are no legal or institutional rules.

One of the biggest problems of MOOCs is their high **resource intensity**. Synergy effects are possible from networking and multiple use. However, considerable time and money is required for the virtual platform, the design, production, teaching and evaluation, and for the development of content and technology. MOOCs are therefore not a suitable instrument with which to make savings. The resource intensity of MOOCs makes the issue of a **business model** more important. There is a range of different options involving participants, finance providers, companies or private service providers. As they have been in development for a short time only, a sustainable option has not yet been established. **Legislation** governing copyright, data protection, funding, capacity, public sector employment and examination is also the source of various challenges. Particularly the resolution of boundaries between "internal" and "external", between "cost-free" and "chargeable" make it very difficult to find solutions, although not impossible.

MOOCs can deliver genuine added value for universities in numerous **application scenarios**. This applies particularly to university marketing, transitional programmes, standardised mass lectures, blended formats, seminar-like events, minor subjects and interdisciplinary and transdisciplinary content. In **lifelong learning** a distinction must be made between promising opportunities on the one hand, particularly in retaining the interest of alumni and offering programmes for very popular disciplines with a very well-established curriculum, and on the other hand more problematic configurations of continuing education. The individualisation required where the canon of knowledge is less standardised and in the case of career transitions incurs high costs. Non-traditional students require target-group-specific supervision. There are also legal issues when the universities enter into competition with private providers.

The trend towards new, above all shorter educational **formats** is increasing with MOOCs. On the one hand, these formats allow more flexible studying and encourage students to take responsibility for their studies

and for organising themselves. On the other, there is a danger that students could find the organisation difficult and their education could be fragmented. Particularly where the development of skills and personality is concerned, it is appropriate to make available a large range of courses from which students can make individual choices, from the purely virtual to face-to-face communication. MOOCs offer positive opportunities in the context of **internationalisation**. MOOCs can support the international mobility of students and researchers and make German universities more competitive on the international market. There is also the option to use MOOCs in collaboration with business. International MOOCs offer the opportunity to engender understanding of cultural diversity but also the danger of encouraging cultural uniformity.

MOOCs permit a high level of **self-regulation** which depends however on framework conditions such as a large number of participants, an atmosphere of trust and subsidiary options for intervention. The problem of the **digital divide** is an indication of the ambivalent nature of MOOCs: motivated learners and teachers can benefit especially. However, for both groups there is the danger of a growing skills gap.

Regarding the **quality of teaching**, MOOCs help to improve transparency. cMOOCs in particular are innovative and supplementary teaching formats. However, quality improvements are only achievable with additional resources. Furthermore, widespread standardisation would present the danger that a process of "McDonaldisation" could impair the diversity of teaching. The distribution of roles between the universities and **external platforms** must be considered. The current suppliers of MOOC platforms appear to be helpful professional service providers. However, in the long term the visibility of the universities could diminish, so platforms by groups of universities should be given consideration.

All in all, MOOCs have already contributed significantly to **innovations** in teaching, even if they are not a cure-all for many challenges. The impetus generated by MOOCs underlines the necessity for German higher education institutions to position themselves strategically on the whole issue of digitalisation.

Table 3: The potential, problems and risks associated with MOOCs

	Potential	Problems and risks
Participants	⊕ Diversity	⊖ Heterogeneity
Participant pathways	⊕ Good participation when "window shoppers" have been eliminated (drop-in problem)	⊖ 10% completion rate (drop-out problem)
Teaching	⊕ Partly innovative	⊖ Partly poor
Supervision	⊕ Peer learning	⊖ Little active support from teachers
Examinations and authentications	⊕ Signature Track	⊖ Legally incontestable identification of individuals necessary ⊖ Network of examination locations needs to be set up
Appraisals	⊕ Self-grading ⊕ Peer grading ⊕ Blind grading	⊖ Full range of grades not used ⊖ Danger of manipulation ⊖ Data protection
Certification	⊕ Badges	⊖ At least random monitoring required to be valid
Credit transfers	⊕ Possible award of ECTS credits ⊕ Recognition as non-formal education	⊖ Despite high expectations, no reliable entitlement ⊖ Legal or institutional rules are missing
Resources	⊕ Synergy effects from networks and multiple use	⊖ Time-consuming and expensive ⊖ MOOCs are not models with which to make savings
Business models	⊕ Diverse options	⊖ None of the options has so far had sustainable success
Legislation		⊖ Various challenges regarding copyright, data protection, state aid, capacity, public sector employment and examination legislation
Application scenarios	⊕ University marketing ⊕ Transitional programmes ⊕ Standardised mass lectures ⊕ Blended formats ⊕ Seminar-like options ⊕ Minor subjects ⊕ Interdisciplinary courses	
Lifelong learning	⊕ Keeping alumnus attention ⊕ Programmes for very popular disciplines with a very well-established curriculum	⊖ Individualisation requires a lot of input ⊖ Non-traditional students require target-group-specific supervision ⊖ Competition law

(Continued on next page)

The potential, problems and risks associated with MOOCs

	Potential	Problems and risks
New formats	⊕ More flexibility ⊕ Self-reliance ⊕ Self-organisation	⊖ Organisational problems for students ⊖ Fragmentation of education ⊖ Development of skills and personality
Internationali-sation	⊕ Encourage mobility and competitiveness ⊕ Instrument for collaboration with business ⊕ Cultural diversity	⊖ Cultural uniformity
Self-regulation	⊕ New forms of collaborative learning	⊖ Necessary environmental conditions: large number of participants, confidence-inspiring atmosphere, subsidiary intervention option
Digital divide	⊕ Motivated learners and teachers benefit	⊖ Growing skills gap
Quality of teaching	⊕ More transparency ⊕ cMOOCs as an innovative, supplementary format	⊖ Quality improvements only with additional resources ⊖ Danger of "McDonaldisation"
External platforms	⊕ Professional service providers	⊖ Decreasing visibility of universities
Innovativeness	⊕ Prompt for strategic positioning of the universities	⊖ MOOCs are not cure-alls

4.2   Applications of MOOCs

In summary, it is clear that after a phase of markedly uncritical, cult-like acceptance of institutions and personalities, those institutions which were intended to be challenged by MOOCs are now looking for suitable areas of application. These areas of application can be narrowed down with the consideration of two issues:

- Which target groups is the course in question intended to reach?
- What phase in the learning life cycle do these courses address?

There is also the question of which courses are most helpful before, during and after a degree course. The following overview is an initial classification: it shows that there are courses which can be useful in all of the

phases distinguished here and others which are only specifically useful when derived from a particular target group.

Table 4: Application areas for MOOCs/new forms of digital teaching

Prior to a degree course[32]	During a degree course	After a degree course
Threshold course Self-assessment		
Guidance tool	Supplement to standardised mass lectures	Alumni
Building skills for non-traditional students	Maximum impact partic. for minor subjects	Interested in learning and education
Marketing to other countries	Cooperative ventures: interdisciplinary / regional/ national/international	Profiling with academic career development
	General studies	
Marketing of higher educational institutions		

It is therefore to be expected that when MOOCs become a routine part of university education, they will be reused or transferred for cost reasons. Universities should use the reach offered by MOOCs to address an audience beyond the traditional academic environment. On an international level, this can include a very diverse audience whose willingness to pay for academic courses is difficult to assess. The following diagram shows these overlaps.

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[32] This applies equally to participants who do not wish to study.

Figure 1: Transition to standard university curricula
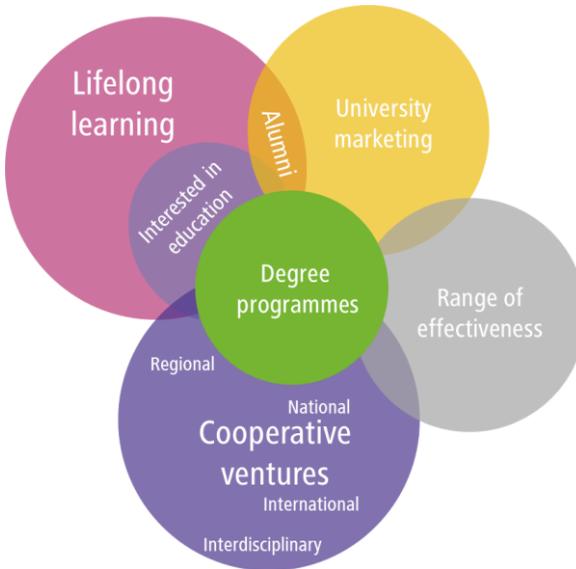
Furthermore, it is possible to categorize the courses on their degree of integration in academic teaching. The following illustration shows an axis for time and an axis for the type of teaching unit. It distinguishes between MOOCs at course level, module level and degree course entry level. The time axis distinguishes between different target groups.

Figure 2: Application areas for MOOCs / new forms of digital teaching
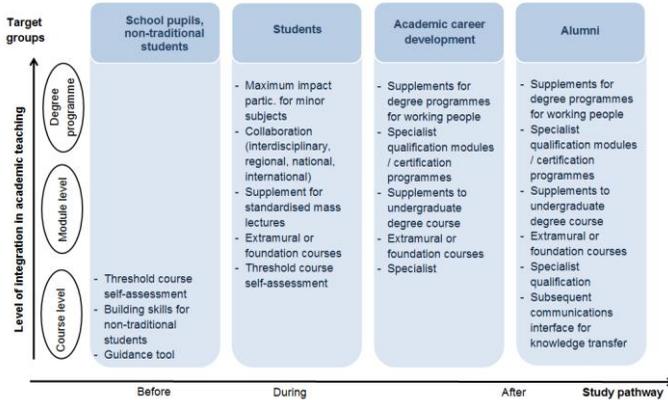
Scenarios

An invented dialogue at the start of this report highlighted the controversy surrounding a new digital teaching and learning format. At the end of this analysis there are different potential scenarios.

1) MOOCs will become part of the academic teaching at higher education institutions and will increasingly be shared between related degree programmes as elements of the curriculum. Credit points will be guaranteed.

2) It will not be possible for universities to realise MOOCs on a sustainable basis. For cost reasons, there will primarily be MOOCs for target groups which are still or are again not part of a university. Private providers will specialise in this, developing their own models and organising the choice of their cooperation partners independently.

3) MOOCs will lead to a wide range of courses which will be offered on platforms run by groups of universities. These chargeable courses will conclude with the award of a "digital badge". Quality standards will be defined and checked before a course is approved. This certification (also as part of a group of additional certificates) improves the chance that completion of the course is recognised as part of a

normal degree, going some way towards making the idea of a virtual campus reality.

4.3   Synthesis: "brick and click"

As early as 1997, the business and innovation consultant Peter Drucker forecast that

> *"Thirty years from now the big university campuses will be relics. Universities won't survive. It's as large a change as when we first got the printed book [...]."* [33]

If this forecast is correct, MOOCs could make a significant contribution to replacing traditional "stone" universities: "From brick to click". Elsewhere it is said that MOOCs are the beginning of the end for universities which do not rank in the top 20.[34] This forecast development is occasionally associated with the view that almost all of the teaching offered by universities in the future will be on the basis of franchising models. Taking this idea further, elite universities particularly would franchise "Premium MOOCs" to other local and regional institutions. It is also conceivable that most education will be available in the virtual network and the (remaining) universities would become brokers or certification institutions which award an academic qualification on the basis of individual formats.

Although some trends do not seem completely unrealistic, in these scenarios the essence of education and university teaching is largely lost. This essence is in the traditional coming together of learners and teachers in a specific space which provides not only the technology but also the necessary atmosphere for learning. A social interaction as constrained by conditions as learning requires a minimum of personal confidence and the interplay of different sensory inputs, which especially can be ensured with face-to-face communication.

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[33] Peter Drucker, in: Forbes, 10.3.1997.
[34] Marcus Riecke, in: Die Welt, 7.06.2013.

MOOC pioneer Sebastian Thrun says:

> *"The belief that education can be replaced by a computer program is a myth. Human contact and mentoring make a substantial difference in learning outcomes."* [35]

So a case can be made for saying that the concept of "brick **and** click" will prevail, with traditional higher education instiutions continuing to exist and offering virtual formats in addition. It is also possible that in the future teaching will take place in several locations. It is undeniable that the digital space is rapidly moving into the universities blurring the boundaries between the conventional and the digital university, with MOOCs as a special case. The higher education institutions must face up to this development.

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[35] Sebastian Thrun, in: Süddeutsche Zeitung, 26.9.2013.

Appendix

1. The development of cMOOCs in Germany

In the German-speaking area, the first cMOOC "OpenCourse 11 (OPCO 11)" was held by Studium Digitale (University of Frankfurt) in collaboration with Jochen Robes who blogs on lifelong learning. In 2012 it was followed by OPCO 12 which was organised jointly by e-teaching.org (Leibniz-Institut für Wissensmedien, [Knowledge Media Research Center] in Tübingen), Multimedia Kontor Hamburg, studium digitale (University of Frankfurt) and the Weiterbildungsblog [Lifelong Learning Blog]. In 2013, COER 13 on the subject of open educational resources was offered in cooperation with other partners. The blended cMOOC "Open Course Workplace Learning 11 (OCWL11)" took place at the University of Tübingen in combination with a face-to-face seminar. The themes of all these cMOOCs were related to education.

2. Selection of cMOOCs organized up to now:

2.1 First and prototype cMOOC:

- CCK08 - Connectivism and Connective Knowledge. Run by Stephen Downes and George Siemens.

2.2 German-language cMOOCs in a university context:

- OPCO11 – Future of learning (02.05. – 17.07.2011), http://blog.studiumdigitale.uni-frankfurt.de/opco11/: considered the 1st German-language MOOC, a project on which studium digitale, the central e-learning facility at the University of Frankfurt, and the blogger on lifelong learning, Jochen Robes, cooperated.
- #OCWL11 – Open Course Workplace Learning 2011 (17.10.2011 – 30.01.2012), http://ocwl11.wissensdialoge.de/struktur/: organised by Dr. Johannes Moskaliuk (University of Tübingen / associate fellow of the IWM), a combination of a face-to-face seminar with elements of a cMOOC/blended MOOC.
- OPCO12 – Trends in E-Teaching. Der Horizon Report unter der Lupe [A Closer Look at the Horizon Report] (16.04. – 21.07.2012), http://opco12.de/ : Collaborative project by e-teaching.org/IWM,

studium digitale, Multimedia Kontor Hamburg and the lifelong learning blogger Jochen Robes.

- #EXIF 13 – Entdecke die Insel der Forschung [Discover the Island of Research (12.06. – 24.07.2013): MOOC on academic work at the FernUniversität in Hagen, Faculty for Cultural and Social Sciences. http://mooc.fernuni-hagen.de/.
- #MMC13 – How to MOOC – the German-language MOOC Maker Course (16.01. – 22.02.2013), http://howtomooc.org: offered by three private individuals, but found substantial resonance in the e-learning community.
- COER13 – Offene Bildungsressourcen – der Online Course zu OER (Open Educational Resources) (08.04. – 28.06.2013): Collaborative project from e-teaching.org/IMW with partners: University of Tübingen, University of Applied Sciences in Munich, Technical University in Graz, BIMS e.V. and the Learning Agency Network.

3. Recognition of ECTS credits

Students enrolled at the University of Frankfurt were awarded two ECTS credits for the German-language cMOOC "OPCO12" for the first time. This was made possible as part of the media competence certificate in combination with attendance at an accompanying tutorial. The University of Regensburg offered a seminar to accompany "OPCO12" as part of which in combination with other work (assignments etc.) ECTS credits were awarded.

SOOC13 from the Universities of Chemnitz, Dresden and Siegen linked MOOCs with institutional teaching. Credits were awarded (only for students enrolled in the degree programmes involved) for certain modules in degree programmes at these three universities: http://www.sooc13.de/organisation/erwerb-von-credit-poins/

ECTS credits have been awarded since mid-October 2013 by the University of Applied Sciences in Lübeck for a MOOC entitled "The Basics of Marketing" and from the summer semester 2014, by the University of Osnabrück for a MOOC on "Algorithms and data structures". However, the

ECTS credits can only be acquired by passing a face-to-face examination, so in these instances, the ECTS credits were only awarded in association with traditional teaching formats or examinations.

About this Reader

This reader was produced by the HRK Committee for New Media and Knowledge Transfer which is chaired by the HRK Vice President for Information and Communication Technology, Professor Dr. Joachim Metzner. The permanent members of the Committee are Professor Dr. Dr. Friedrich Hesse, Professor Dr.-Ing. Helmut Hoyer, Professor Dr. Michael Jäckel, Ms Viktoria Klecha and Dr. Friedhelm Nonne. The Committee is supported by Dr. Elmar Schultz at the HRK Head Office.

The conference "10 Jahre e-teaching.org [10 years of e-teaching.org]" on 26 June 2013 in Tübingen laid the foundations for the paper. In association with this conference, initial consultations were held with Professor Dr. Ulrike Cress, Professor Dr. Dr. Godehard Ruppert and Professor Dr. Dr. Thomas Schildhauer.

Dr. Heike Brand, Professor Dr. Ulrike Cress, Professor Dr. Andreas Henrich, Dr. Patrick Jermann, Mr Hannes Klöpper, Mr Marcus Riecke, Professor Dr. Wolfgang Schulz and Mr Felix Seyfarth also worked on the reader at subsequent stages.

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