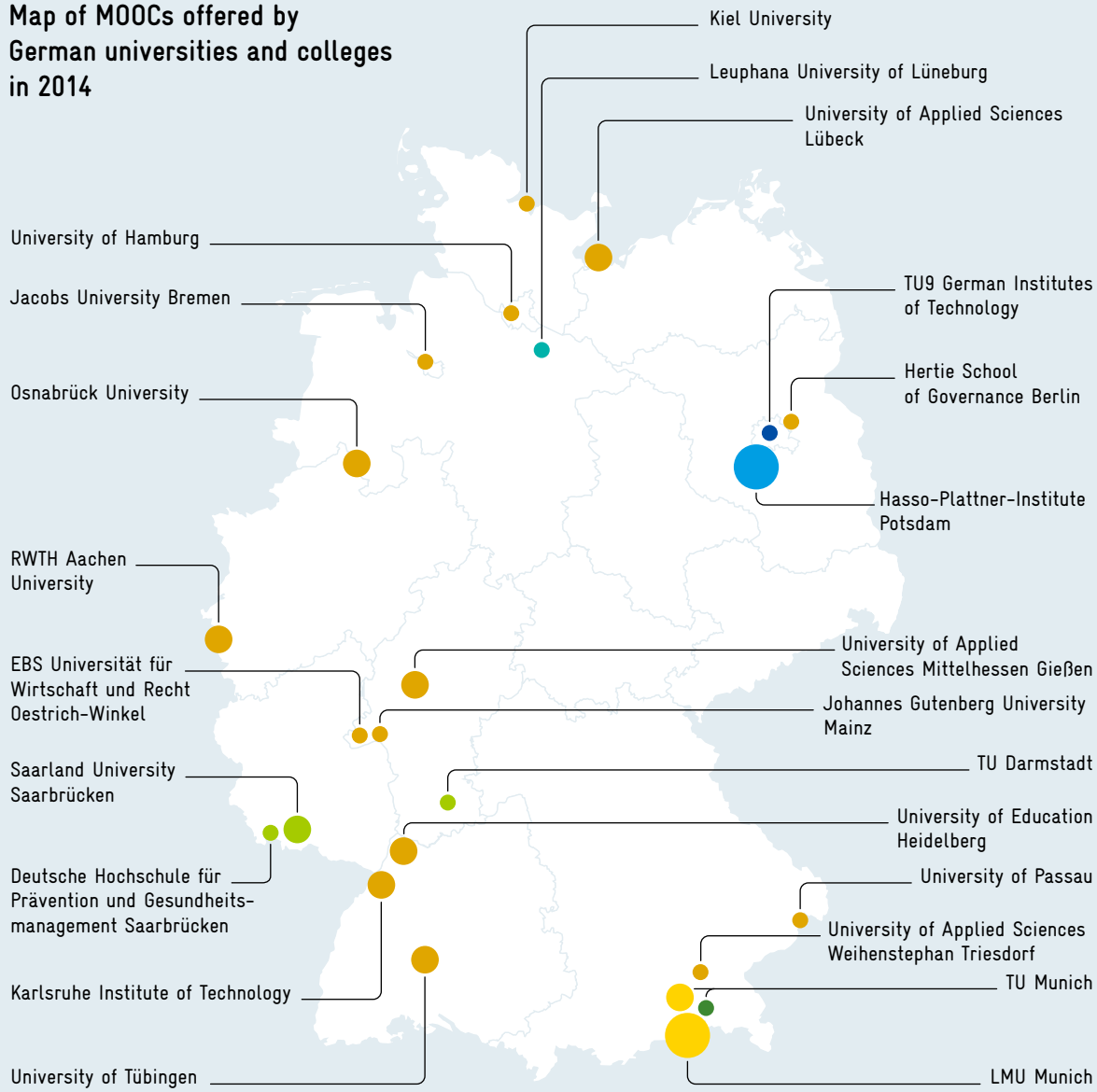
MOOCs: an innovator in the education sector

MOOCs (Massive Open Online Courses) are offered by universities and colleges on the internet and usually have a very large number of participants. MOOCs do not only target students, they are also open to interested users worldwide.

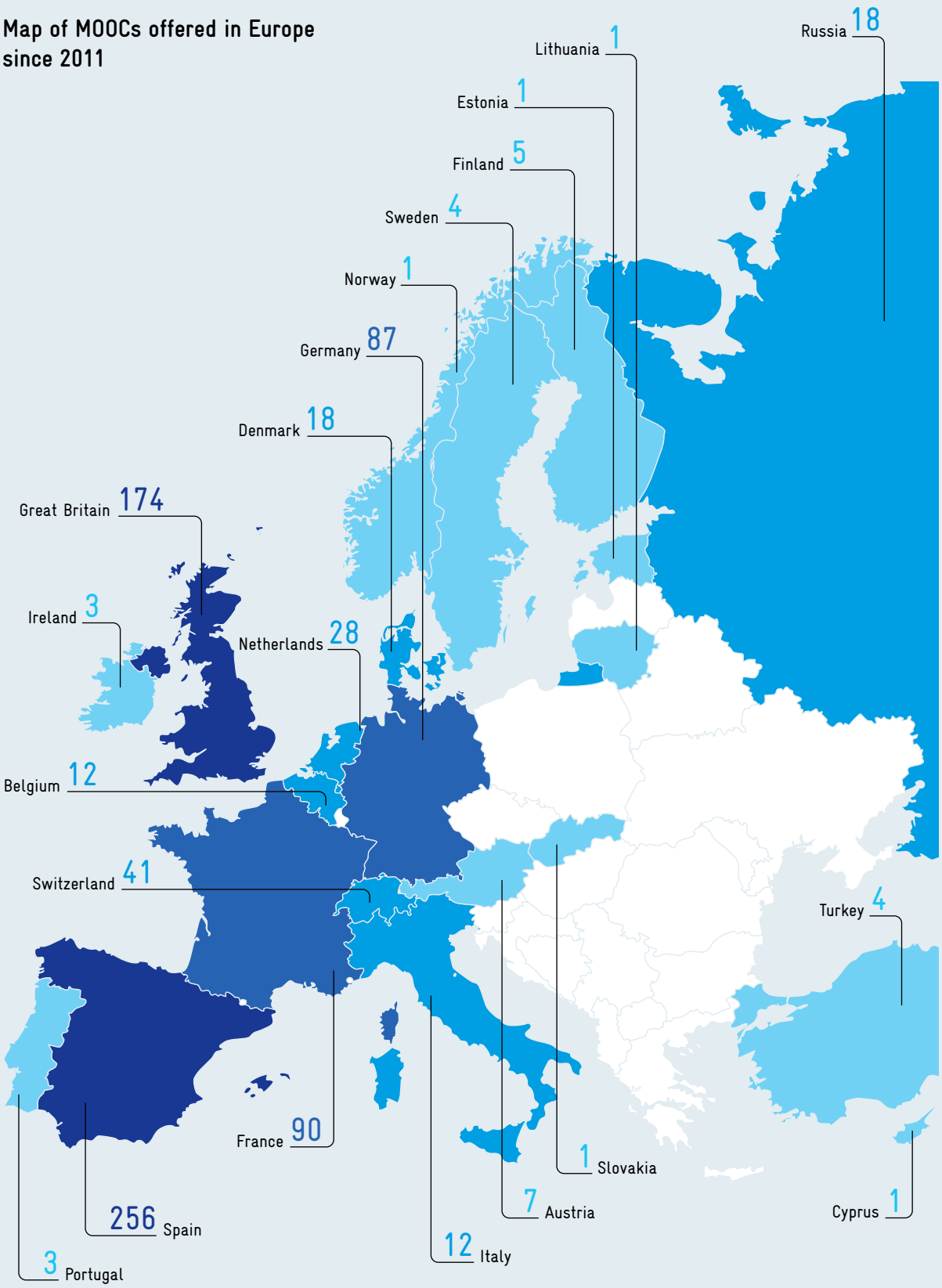
Map of MOOCs offered by German universities and colleges in 2014



Source: Own depiction based on European MOOCs Scoreboard and own research.

Data Download

Map of MOOCs offered in Europe since 2011



Source: Own depiction based on European MOOCs Scoreboard.

B 2 MOOCs: an innovator in the education sector

MOOCs are one of the most frequently discussed innovations in the tertiary education sector. The abbreviation MOOC stands for Massive Open Online Courses,[143] i.e. courses that are available online, usually have a very large number of participants, and are open to interested users all over the world.[144] These courses are offered on so-called MOOC platforms (cf. Box 6). The MOOC movement was initiated by lecturers who were keen to experiment and wanted to use the internet to improve teaching and reach a broader target group. MOOCs have been attracting rising media attention in Germany since 2011, when Stanford computer-science professors Sebastian Thrun and Peter Norvig offered a course on "Artificial Intelligence", which reached more than 160,000 participants. The number of platforms and courses has increased considerably in the meantime.

MOOCs are not new in every respect,[145] but what is new about them is that the best universities in the world (Harvard, Stanford, Massachusetts Institute of Technology – MIT) have become active as pioneers and are now offering their courses free of charge to everyone. Participants with different social, economic or educational backgrounds anywhere in the world can now take part in education from the best universities.[146] By contrast, conventional online university courses or traditional lecture podcasts can typically only be accessed by students; they are not equally open to people of all educational backgrounds from all countries.[147]

In the meantime, MOOCs are regarded as a disruptive innovation that can fundamentally change the existing markets and value chains in the education sector. Against this background, the Commission of Experts examines the current dissemination of MOOCs in Germany, the challenges to teaching and learning processes, and the resulting educational opportunities and implications for research and innovation in the education field.

MOOCs at German universities and colleges B 2-1

Few MOOCs offered at German universities and colleges up to now

A controversial discussion on the prospects and risks of MOOCs has been ongoing in Germany since 2013.[148] In order to create an empirical basis for the discussion on MOOCs in Germany, the Commission of Experts commissioned a study from HIS-Hochschulentwicklung (HIS-HE) in the summer of 2014. This study involved broadly based surveys of university and college leaders as well as MOOC lecturers.[149] The survey of vice-presidents and vice-rectors responsible for academic teaching was answered by 169 people (43 percent). On this basis, a second survey of MOOC lecturers was conducted; it was answered by 46 people (46 percent).

The survey of the university and college leaders shows that the dissemination of MOOCs in Germany is still low at present, despite the intensive discussions. Only a sixth of the responding universities and colleges had offered MOOCs in the past or were currently offering such courses. Another sixth intended to do so in the future.[150] The map on page 50 provides an overview of the MOOCs currently offered by German universities and colleges.

Great commitment at individual German universities and colleges

57 percent of the university and college leaders who took part in the survey indicated that they had considered MOOCs in some form; 42 percent said that a committee at their university/college was looking into MOOCs; but only 8 percent of the respondents consider online teaching [151] to be strategically important.[152] Few expected an additional benefit for their respective institution as a result of a more distinct profile or improved competitiveness.[153]

Box 06

MOOCs: history, types and platforms

The first MOOC entitled "Connectivism and Connected Knowledge" was launched by George Siemens and Stephen Downes in 2008 at the University of Manitoba in Canada. Despite its 2,300 participants, the course had a highly interactive component. Such courses later became known as cMOOCs, where the "c" stands for "connectivist". A characteristic feature of cMOOCs is that the contact and communication between students and lecturers leads to new knowledge networks in which the students generate works or content of their own.[154]

Today, the public discourse is more influenced by so-called xMOOCs, where "x" stands for "exponential" and relates to the significantly higher number of participants compared to conventional courses.[155] The first three xMOOCs were offered in 2011 by lecturers at Stanford University; they attracted over 100,000 participants per course. They subsequently developed into the platforms Coursera and Udacity.[156] The main characteristic of xMOOCs is their almost unlimited scalability. Unlike cMOOCs, their main objective is to teach pre-structured knowledge.[157] In addition, however, they also provide a good basis for what is known as blended learning, i.e. combining online content with other didactic means such as exercises or discussions in the lecture hall. Furthermore, xMOOCs can also be used in the context of so-called flipped-classroom teaching,[158] in which the students acquire the pure knowledge online via video lectures and then practise and apply it together with the lecturers in the university lecture hall.[159]

The primary task of so-called MOOC platforms is the technical implementation of the MOOCs, i.e. providing the course software and the necessary server capacity. In addition to this core task, the different platform operators experiment with additional services for their partner universities and colleges, which are charged membership fees.[160] The MOOC platforms also play a key role in data storage. Depending on MOOC platform, the user data relating to teaching and learning behaviour are also used for research purposes or commercialised. In addition, the leading international platforms[161] (Coursera, Udacity, edX) assume a key role in the marketing of the courses by operating as separate brands reaching millions of users.[162] Furthermore, since 2013 edX's course software has been available as open-source software (openEdX) and forms the basis of several national MOOC platforms. Large platforms in Europe include the French platform FUN and the Spanish Miríada X; there is also a German MOOC platform called iversity (a Berlin-based start-up).

The willingness to consider and implement MOOCs increases with the size of the institution.[163] Ludwig Maximilians University of Munich (LMU), and Technische Universität München (TUM), are among the leading German universities in the use of MOOCs. The Hasso Plattner Institute at the University of Potsdam and the Lübeck University of Applied Sciences, with its subsidiary company Oncampus, also put a strong emphasis on MOOCs. However, MOOCs play a less strategic role at the institutions mentioned than at leading universities in other European countries or the USA.[164] For example, the École Polytechnique Fédérale de Lausanne (EPFL),[165] Graz University of Technology together with the University of Graz[166], and MIT in the USA[167] all pursue a very proactive strategy (cf. Box 7).

Wide range of participants and course components

The survey of lecturers showed that the numbers of students taking part in the MOOCs offered at German universities and colleges rarely exceed 100,000, a figure often stated in the English-speaking world.[168] Even so, as a rule MOOC participants significantly exceed the number of participants attending regular courses at German universities and colleges.[169] One of the most popular MOOCs from a German-speaking university – with 93,000 participants – was the English-language course "The Future of Storytelling" from the Potsdam University of Applied Sciences.[170] Another example is the English-language course "Competitive Strategy" from LMU with 95,000 participants; a Chinese-language version is now also available.[171]

Box 07

Examples of the strategic embedding of MOOCs

TUM has developed five MOOCs since 2013 and is planning more. The MOOCs are offered on Coursera or edX.[172] LMU has also developed a total of five MOOCs since summer 2013 and offers them exclusively via Coursera.[173] Up until December 2014, LMU's courses had a total of 800,000 participants worldwide;[174] a total of more than 50,000 participants had registered for TUM's courses worldwide.[175]

The EPFL has a pronounced strategic focus. It was the first European university to offer a MOOC in 2012.[176] Because French is the native language, the EPFL's range of MOOCs is directed mainly at the French-speaking world, including French-speaking developing countries. From summer 2012 until February 2014, it launched a total of 21 MOOCs – 15 on Coursera and six on edX – in French or English; 13 more MOOCs are at the planning stage. Up until November 2014, a total of over 750,000 students took part in the courses worldwide.[177] The EPFL divides its MOOCs into four different types that clearly illustrate the strategic direction. First, there are MOOCs whose aim is to raise the university's global visibility; second, MOOCs for the university's own – and possibly external – students, which create time for flipped classroom situations; third, MOOCs specifically for development aid; and fourth, shorter MOOCs designed specially for the broad Swiss population, but also other interested people.[178] This specific example illustrates changes in learning processes and ways of accessing educational content and potential markets. It also shows that access to markets is partly dependent on the prevalence of the respective national language, a fact that limits possibilities for German-speaking MOOCs.

Based on the above-mentioned survey of lecturers, a review of the components of the MOOCs generally offered at German institutions revealed a wide variety of didactic resources.[179]

Unclear role of MOOCs in regular tertiary teaching

The motives most frequently mentioned by the MOOC lecturers surveyed include an interest in new course formats, a desire to participate in the current MOOC development, and an ambition to reach new target groups. However, it is still largely unclear how MOOCs can count towards a regular university degree. At present, only very few universities and colleges in Germany recognise external MOOCs as part of a degree at their university or college.[180] At the present time, therefore, the fast-growing supply of MOOCs in Germany is hardly leading to a systematic broadening of, or improvement in, the quality of typical degree programmes at universities and colleges. Yet, the targeted inclusion and recognition of external MOOCs in regular study programmes could open up great opportunities, especially for smaller universities and colleges or for subjects with smaller numbers of students. Furthermore, MOOCs could create extended opportunities for a form of general studies (studium generale); and in smaller subjects they could broaden the range of available internal courses and in this way improve the breadth and quality of the training. MOOCs are thus also influencing the competitive conditions on the education market.

Among MOOC participants, too, there is a wide range of goals. Apart from obtaining a course certificate, this can, for example, be a search for guidance in their choice of studies or a need to acquire the relevant German terminology in their given field.[181] This broad range of goals also explains frequently observed low graduation rates. For example, in more than half of the MOOCs offered, the above-mentioned survey of lecturers showed that a maximum of 20 percent of the participants actually completed the course with a certificate of attendance or graduation. Yet, when students terminate a MOOC early, this does not mean that they are dropping out in the classic, negative sense, because they may have already achieved their goal by this time.

Big differences in development costs

To date, hardly any reliable statistical data are available on the costs of creating MOOCs. According to the HIS-HE study,[182] examples vary between 25,000 to 500,000 euros. These big differences stem partly from different demands on the content of the courses and different production methods, some of which involve more work than others. In addition, considerable costs are sometimes caused by developing individual MOOC platforms, which soon leads to higher costs per course if there are only a small number of courses.[183] However, since the number of potential students can be several times higher than for regular courses, this can sometimes justify the high costs.

MOOC funding differs according to the higher-education system

Up to now, most MOOCs have been financed by the regular higher-education budgets for teaching and research, not by the users (i.e. private individuals or companies). Sporadically, there are funding programmes financed by the Länder, or third-party funds awarded via a competitive system.[184]

Neither in Germany nor in the USA are MOOCs currently generating substantial revenue.[185] As far as future income prospects are concerned, however, the starting position in Germany differs systematically from that of the USA and other countries where students tend to bear bigger financial burdens for their university education. A large number of business models are expected to emerge in the USA.[186] In Germany, such business models could become relevant in further education. The kind of profile-building processes among individual universities and colleges recommended in the 2012 Report could lead to opportunities to generate revenue to support this profile-building.

MOOCs are changing competitive dynamics and creating new market structures

Even if some higher-education systems do not use MOOCs to generate new revenue, they can still have considerable positive effects on an institution's reputation. Whenever the huge numbers of students lead to economies of scale, small differences in quality can be reflected in large differences in demand. This results in strong incentives to improve and spend more on promising MOOC courses, because investments in quality can have a decisive effect, both financially as well as in terms of reputation.

Overall, one can expect a concentration on a small number of especially popular MOOCs.[187] In addition, sophisticated niche products and specialised portals for different market segments are likely to emerge. As long as students can use these offers at virtually zero cost, and subsequently adapt their expectations of content and quality, then even traditional universities and colleges will not remain immune to this development in the long run – even if they do not offer their own MOOCs.

MOOCs: an opportunity for the German academic landscape B 2-2

Strengthening the unity of research and teaching

MOOCs create new incentives for quality improvements in teaching, although the strength of these effects depends on who receives the revenue generated by MOOCs.[188] The concept of flipped classrooms connected with MOOCs can strengthen the discussion culture. In this context, professors become interpreters of MOOCs, in a similar way to today when text books are used. MOOCs distributed by open access or open source systems are needed to provide the planning security and content freedom needed by universities and colleges and lecturers using external MOOCs.[189] MOOCs should therefore be taken into account in the introduction of the general exemption to copyright for scientific and education purposes announced in the Digital Agenda.[190]

However, the use of MOOCs – e.g. for teaching standard course contents – also creates space for teaching research-related content in small, discursive in-class seminars. This would enable universities and colleges to return more closely to Humboldt's ideal. This would require policy-makers to strengthen research-related and specialised teaching methods and not to use MOOCs as an excuse to cut teaching budgets.[191] The universities and colleges themselves ought to undergo a radical innovation process to enable them to make use of the available potential and thus simultaneously strengthen the fundamental principles of the unity and freedom of research and teaching.[192] This requires creative concepts from universities and colleges, but also a generous amount of regulatory leeway in order to be able to implement creative ideas, at least experimentally.[193] Without an assurance of financially stable budgets, such creative and efficiency-

raising ideas could possibly be stifled by worries about budget cuts.

More flexibility for students

Such a strategic use of MOOCs can also make it easier for students to organise their studies, since they can be more flexible as regards timing, adapt courses to their individual learning speeds – and reconcile their studies with their work or child-care responsibilities. Furthermore, MOOCs can already give prospective students an insight into the subject before beginning a degree programme, enabling them to make better-informed educational decisions. In view of the fact that about a third of the first-year bachelor's-degree students do not complete their degree programmes these days at German universities and colleges,[194] innovative solutions must be found to avoid expensive "false starts" in the education system – with all the long-term psychological consequences these involve.[195] One such solution might be to deliberately introduce prospective students to MOOCs.[196]

MOOCs can relieve the burden on universities and colleges by taking on some of the pure teaching of standardized knowledge. The resources freed up in this way can be used to improve teaching and promote students' career and personality development, e.g. with targeted activities to support network building between students, lecturers, alumni and potential employers. German universities and colleges in particular, with their strong focus on lecture-style teaching, will have to adapt if they do not want to lose students as they become increasingly mobile.[197]

MOOCs can reach new target groups

Furthermore, MOOCs can reach target groups who are in regular employment and in this way support lifelong learning.[198] Already today, over a third of non-traditional first-year students in Germany are enrolled with distance-learning universities and colleges – suggesting that this target group are especially open to online teaching and likely to use MOOCs in the future.[199] MOOCs are easily accessible sources of informal further education that are likely to attract the broad sections of the population who currently have no access to academic training.

In addition, MOOCs can make an important contribution to strengthening education systems in developing countries and emerging economies. EPFL,[200] for example, has declared development cooperation as one of the aims of its overall university MOOC strategy and has already recorded initial successes.[201]

Raising the international visibility of German universities and colleges

MOOCs can also have positive effects as a marketing instrument for universities and colleges.[202] High-quality MOOCs that are used worldwide can improve the reputation of individual universities or colleges – and of Germany itself as a location for education and research – thus generating long-term positive effects. Since MOOCs' broad distribution give them a strong reputation effect, universities and colleges should support their best lecturers and outstanding scientists in the development of MOOCs and create suitable decision-making structures and appropriate quality-assurance mechanisms for the MOOCs offered by their lecturers.

Recommendations B 2-3

In the Commission of Experts' view, MOOCs are an important and useful supplement to the teaching and research instruments currently used in universities and colleges. So far, however, the reception of MOOCs in Germany has been comparatively hesitant.

German universities and colleges should be more active in using the opportunities offered by MOOCs and be given appropriate support by education policy.

Recommendations to universities and colleges

- Universities and colleges should intensively examine new models of combining different forms of learning and teaching, such as MOOCs, blended learning, flipped classroom and other elements.
- It does not make sense for every university and college to create its own MOOCs. Universities and colleges engaging in their own MOOC production should do this as part of an overall strategy with clearly defined objectives. Since the creation of MOOCs can be time-consuming and expensive, it is important that this effort can be justified by improvements in quality, reaching new target groups or an improved market position. In this context, a meaningful MOOC strategy

should go hand-in-hand with the kind of profile-building by universities and colleges already called for in the 2012 Report.
– Universities and colleges that want to produce their own MOOCs should consider joining forces with suitable partners, forming collaborations to produce high-quality MOOCs at low overall costs.

Recommendations for education policy

– Since MOOCs can support quality improvements in higher education, political stakeholders should take a fundamentally positive interest in their development. Public funding for the creation and use of MOOCs can be useful in cases where an increase in expenditure can be justified by quality improvements and where the shared use of MOOCs make up for increased fixed costs. One prerequisite for an effective and efficient use of MOOC funds is that MOOCs are clearly integrated into strategic overall concepts of the universities and colleges. Beneficial funding might therefore include financial incentives to draw up strategic concepts or to create a quality competition, e.g. a MOOC excellence competition. Excellent MOOCs should also be supported to improve Germany's visibility and reputation as a location for research and innovation.
– Additional funding for MOOCs could also be made available to reach new target groups, including younger people with little or no experience of higher education (who have been almost impossible to reach up to now), older employees within the framework of lifelong learning, and talents of all age groups in developing countries who have hitherto had no access to education. This could improve educational equality and the permeability of the education system.
– To ensure that MOOCs produced with public resources can be extensively used and changed – or adapted – they should be made as freely available as possible or shared under open licenses. In chapter A 2, Open Access, of its 2013 Report, the Commission of Experts set out how free access to scientific findings should be organised.[203]
– Any support policies should avoid costly duplications of MOOC platforms and give preference to open source infrastructures.
– The ministries in charge of financing universities and colleges should not use the integration of MOOCs as a justification for cutting the financial resources allocated to universities and colleges for teaching. Should any financial leeway emerge, it must be left within the universities and colleges to pay for long-overdue quality improvements in teaching.
– The public sector should create a legal framework that allows individual universities and colleges to experiment with MOOCs and to develop innovative concepts for improving teaching and strengthening the unity of research and teaching. This may include areas such as admission to studies, development of study programmes, financing keys, copyright, teaching loads, remuneration and higher-education funding.
– Questions of data protection should be clarified at an early stage (cf. on this also chapter A 4). MOOC platforms should ensure that users are clearly and understandably informed about their platform's privacy policy.