

# New global interactive strategies for teaching and learning

## SUMMARY

Today, digital technologies are fully embedded in the way people live, learn and work. In the EU, children become active online from the age of 7, and 76% of EU households have access to broadband Internet. However, analysis shows that the early use of digital technologies is not necessarily linked to good digital competencies. Teachers are not adequately prepared for the digital revolution either: only 20% of students in the EU are taught by digitally confident teachers.

Learning increasingly takes place in an environment which is constantly evolving to respond to the personal needs of each learner. The emergence of Open Educational Resources and Massive Open Online Courses is expected to offer multiple advantages in terms of increased access to education, reduced costs and flexible timetables, to name just a few. However, there is little scientific evidence to prove the efficiency of these new models. Some critics even argue that they may well be just another attempt to further commercialise higher education. Meanwhile, blended learning – a combination of traditional (classroom) training with digital online content – is seen by many as the best alternative.

In the EU, the economic downturn has led many countries to reduce investment in education, and search for more efficient ways of deploying available financial resources. However, the relative importance of public funding, and different policies on tuition fees, probably account for the still lower interest in digital learning in the EU in comparison to the USA. In 2013, the European Commission published a communication on innovative teaching and learning through digital technologies, to encourage high-quality education.

*This briefing includes hyperlinks to video material.*



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## Background

Skills and qualifications are one of the key factors determining the economic success of the European Union (EU). However, the current economic crisis is challenging EU education and training systems from two perspectives. First, Member States need to cut back public spending while supporting [growth-friendly expenditure](#). Second, the EU is faced with a [youth unemployment rate](#) of 23%, representing a considerable untapped resource. Education and training, with its impact on productivity and innovation, is the perfect example of growth-friendly expenditure. Yet more than half the Member States have decreased their spending in this field.<sup>1</sup> At the same time, a Survey of Adult Skills prepared by the Organisation for Economic Cooperation and Development (OECD) [indicates](#) that Europe today faces a serious skills gap that risks hampering growth and employment in the future. To close this gap and bring adult skills into line with the needs of the EU economy will [require](#) substantial investment in the modernisation of education and training systems over many years. But securing the necessary investment in times of crisis will not be easy.<sup>2</sup>

One possible approach to meeting this double challenge would be to promote innovation and exploit the potential of new technologies and digital content. This path has been endorsed in the recent European Commission [communication](#) on innovative teaching and learning through new technologies. In February 2014, the 28 EU ministers responsible for education [confirmed](#) this strategy, encouraging Member States to exploit the potential of new technologies and digital content to complement traditional educational approaches.

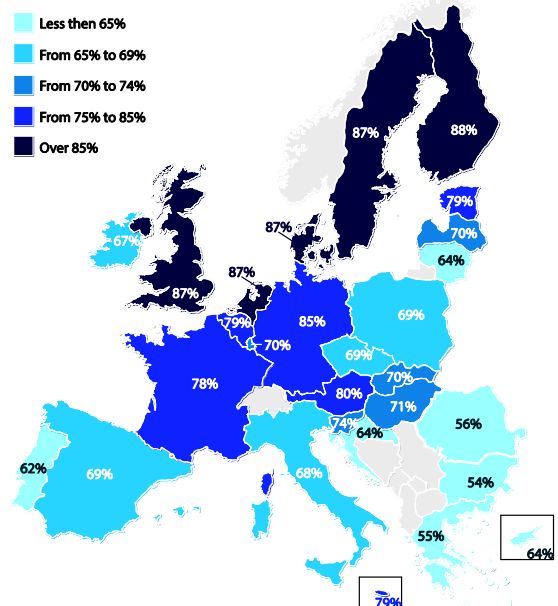
## E-learning (or how to keep pace with the digital revolution)

### Where the EU stands

The world of education is currently undergoing a massive transformation as a result of the digital revolution.<sup>3</sup> New technologies create learning opportunities that challenge traditional schools and colleges, enabling people of all ages to pursue [learning at their own pace](#). They take education out of school into homes, libraries, and workplaces, where people can decide on the content, timing and methods that best suit their particular needs.

In this context, access to Internet and notably to broadband appears a prerequisite. During the past decade, information and communication technologies (ICT) have become more accessible and affordable in the EU.<sup>4</sup> Eurostat data [show](#) that in 2013, a majority of EU households - 79% - had Internet access at home. In all EU countries [broadband](#) was by far the most common form of Internet access, used by 76% of EU households.<sup>5</sup> However, analysis of this data indicates that the so-called digital divide is still not closed and there is a persistent gap between northern and southern parts of the EU on the one hand, and between eastern and western parts on the other (see figure 1). More importantly, the digital access divide is only the first level of digital divide [defined](#) by experts, the other two being the digital capability divide (i.e. the ability to

**Figure 1 - Percentage of EU households with broadband Internet access**



Data source: [Eurostat](#), 2013, except for Sweden 2012.

use the technology) and the digital outcome divide (i.e. accounting, for instance, for differences in productivity). Each influences the next and has an impact on learning.

In the EU, children start going [online](#) at a very early age: 7 to 9. However, European Commission [analysis](#) and [data](#) from Eurostat suggest that 'digital natives' are not always 'digitally competent'. Research from the OECD [indicates](#) that there is not enough empirical evidence to support the idea that students' use of technology and digital media is transforming both the way in which they learn and their expectations about teaching and learning. Surprisingly, it demonstrates that a majority of students do not wish technology to bring a radical transformation in teaching and learning.<sup>6</sup> Teachers are not adequately prepared for the digital revolution either: an EU-wide survey [shows](#) that while 70% of teachers recognise the importance of ICT-supported methods, only 20% of students are taught by digitally confident teachers.

## Glossary

**E-learning** is an [inclusive term](#) describing educational technology which supports learning and teaching electronically. It is broadly synonymous with online, digital, virtual, and ICT-based learning. Each alternative name emphasises a particular aspect, component or delivery method. E-learning should not be confused with **distance education**, which delivers instruction to students who are not physically present in a traditional setting such as a classroom. In contrast, **distance e-learning** combines distance education and e-learning, and is characterised by the extensive use of online communication in an interactive learning environment.

### Digital learning strategies have much to offer...

Digital learning is expected to offer [multiple advantages](#), namely in terms of broadened access for all to education. The potential benefits include diverse knowledge sources often provided for free, no geographical limits, flexible timetables and methods that can be easily personalised and the possibility for teachers to share and create content with colleagues and learners from different countries. Most importantly, digitally supported learning is believed to reduce costs<sup>7</sup> for educational institutions and for students, and to enhance the employability and improve the social inclusion of people from [disadvantaged backgrounds](#). This impact on equity requires, however, sustained investment in educational infrastructure and human resources. Finally, digital technology is expected to allow for new ways of learning and assessing,<sup>8</sup> focused more on what the learner is capable of doing rather than on the mere acquisition of information or on what the learner is capable of repeating.

### ...but there is still a fair amount of uncertainty linked to them

It is generally believed that ICTs can empower teachers and learners and that their overall impact is positive. There is, however, little scientific evidence of the concrete contribution of ICTs to the learning process. ICTs' impact remains [difficult to measure](#), because of the [lack of appropriate indicators](#), and therefore open to debate. [Evidence](#) is quite often derived from opinion-based studies interpreting perceived,<sup>9</sup> not actual, impact. Some experts [describe](#) them as tools to support and improve existing learning processes rather than having any transformative potential. Studies tend to find [small positive educational outcomes](#) without ascertaining the causality of the link (i.e. it may be that more effective schools and teachers are more likely to use ICT and digital technologies effectively). Moreover, the cost advantage of digital learning is disputed. A recent comparative study (2012) [suggested](#) that the idea that online learning is less expensive is based more on intuition than on fact, since most existing studies lack rigorous control and use self-reported data.

## Overview of new forms of e-learning

Transforming education [requires](#) pedagogical, organisational and technological innovation. The increased use of ICT, particularly the Internet, brought in a new era in course design and delivery in ways never before experienced in the mainstream model of traditional education paradigms or distance education. The marriage of the two concepts, distance education and

e-learning, marks a new strategy in delivering course content developed by conventional educational institutions or through open resources.

## Open educational resources

Open educational resources (OERs) first appeared within the wider '[Openness](#)' movement in the mid 1980s, based on the assumption that [knowledge](#) should be disseminated and shared freely through the Internet for the benefit of society as a whole. OERs [consist](#) of teaching, learning or research materials that are in the public domain or released with an intellectual property licence that allows free use, adaptation, and distribution (see box). OERs range from textbooks to curricula, syllabi, lecture notes, assignments, tests, projects, audio, video and animation.

### OERs and licensing

Open educational resources often involve issues relating to intellectual property rights. To address this issue, several [open content licences](#) have been developed. These include the [Creative Commons licences](#) and the [GNU General Public Licence](#) developed by the [Free Software Foundation](#). Open licensing provides controlled sharing with some rights reserved to the author. However, practitioners [warn](#) that this type of licensing can be problematic since the boundaries between not-for-profit, educational and commercial exploitation or distribution, are often blurred and/or overlapping.

In 2001, the Massachusetts Institute of Technology (MIT) released a number of its [courses](#) online for free access<sup>10</sup> through its [OpenCourseWare](#) project, with 2 150 courses now available online. In 2005, this and other leading OER projects formed the [OpenCourseWare Consortium](#) which seeks to allow universal access to education. In 2007, [OER Commons](#) opened as a digital library and intermediary for openly licensed and freely available teaching and learning content. In 2009, California set up the first national open source [Digital Textbook Initiative](#). Other examples include the Free Education Initiative from the [Saylor Foundation](#), which has built over 300 free online courses with OER materials. The foundation also supports the creation of new openly licensed materials through its [Open Textbook Challenge](#). In the EU, the [Learning Resource Exchange for Schools](#) offers more than 200 000 open educational resources based on language, subject, resource type, and age range.

UNESCO [underlines](#) the importance of OERs for both students and teachers. The former benefit from free or low-cost access to courses and even degree programmes, while the latter can adapt those courses to local languages and build on them. On the down side, experts [claim](#) that the imbalance between the provision of OERs and their utilisation is problematic. The vast majority of OERs are in English and based on Western culture, which limits their relevance and risks relegating less developed countries<sup>11</sup> to the role of consumers. Other concerns include [quality assurance](#), [accreditation](#), and [sustainability](#).

## Massive open online courses

MOOCs are a recent development in distance education. They started [emerging](#) in the USA in 2011 with the clear purpose not only to provide more learning opportunities, but also to improve the learning experience. Such flexible online courses allow students to choose their level of participation in an *à la carte* manner. Higher education institutions offering MOOCs do not award credits, but only a statement of accomplishment or a certificate.<sup>12</sup> MOOCs are developed by for- or non-profit private companies in partnership with universities or individual scholars. The latest generation MOOCs are referred to as xMOOCs, to distinguish from an earlier type, known as cMOOCs (c for [connectivism](#)). The latter were developed and led by academics through open-source web platforms, while xMOOCs consist of pre-recorded content presented by a subject expert. The idea with xMOOCs is to allow the platform to repeatedly run the same classes throughout the year on a rolling recruitment basis, with the best performing students from the previous 'class' acting as community teaching assistants for the subsequent one. Examples<sup>13</sup> of such platforms include [Coursera](#), developed by Stanford University and [edX](#), funded by MIT and Harvard University.<sup>14</sup> The

largest concentration of MOOCs is still in the USA and the movement is still very much US-driven<sup>15</sup> (see figure 2). However, statistics [suggest](#) that while EU universities took more time to get involved, they now account for approximately one-third of the MOOCs in the world (see figure 3).

For some, MOOCs [represent](#) a learning revolution, providing high quality education at low cost,<sup>16</sup> and unprecedented prospects for global access and participation.<sup>17</sup>

However, concerns have been [voiced](#) that many MOOCs are not truly innovative, but use fairly traditional learning approaches, and are therefore just an attempt to further commercialise higher education. Critics [emphasise](#) that the learning process involves "a thoughtful interaction between the student and the instructor". They claim personal contact is precisely what MOOCs lack since they contribute to creating a 'crowd' and not a 'community' and thus fail to evolve into a learning relationship.

It has been [suggested](#) that MOOCs would gradually evolve into MOCCS – mid-sized online closed courses – that would either provide learning support, assessments and credit for a fee, or be delivered through licensed provision in the context of a university. In any case, there is already at least one [counter-stream](#) to MOOCs: distributed open collaborative courses, or DOCCs, challenge both the role of the instructor (as a super star) and the value of 'massiveness' in the educational process offered by MOOCs.

## Blended learning

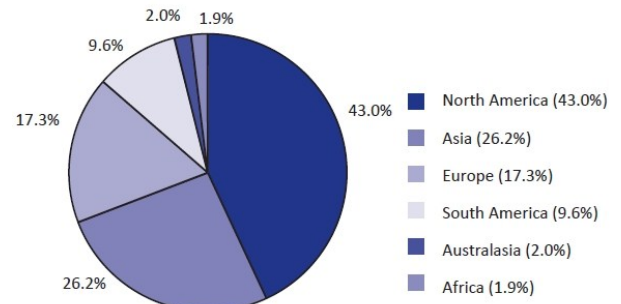
This educational model [combines](#) traditional (classroom) training with digital on-line content, thus addressing one of the major criticisms noted above, namely the lack of interaction with a teacher. It is used both in high schools (see box) and universities. With blended learning, students are [not limited](#) by their individual teachers' specific expertise or teaching methods. Professionals [claim](#) that in blended models

teachers can spend less time assessing students and more time teaching and creating learning paths or 'playlists' to match individual students' needs. An extensive study (2010) comparing the effectiveness of online and face-to-face instruction [concluded](#) that blended learning had a larger advantage relative to purely face-to-face or purely online instruction<sup>18</sup>. Analysis (2013) [shows](#) that blended learning environments are still students' preferred option.

## Educational video games and collaborative virtual environments

Researchers argue that [game-based learning](#) and well-designed video games can motivate students to [learn less popular subjects](#), such as mathematics. Taking as long as 100 hours to win, some of them are very complex and encourage players to try [different ways of learning](#) and thinking. [Immune Attack](#) is an example of such a game initiated by the Federation of American Scientists as an alternative means to teach complex biology and immunology topics to students. Practitioners [assert](#) that good computer games develop the skills needed in a [cross-functional team](#) (i.e. every member of the team is an expert in a specific area, but able to understand everybody else's role and even to replace them, when necessary). Researchers claim that games can even encourage active [civic and political engagement](#).

**Figure 2 - Coursera students by continent of residence**



Data source: UNESCO, [Introduction to MOOCs](#), 2013.

### Flipped classroom

Flip teaching (or [flipped classroom](#)) is a form of blended learning in which students learn new content online by watching video lectures usually at home, and focus on specific issues, projects, experiments in class, with teachers offering more [personalised guidance and interaction](#) instead of simply lecturing. It has been strongly advocated by Salman Khan, founder of the [Khan Academy](#).



Collaborative virtual environments are modelled on video games and provide a visual experience simulating reality. Virtual reality systems use avatars to represent human users in computer-generated environments. American universities have been [experimenting](#) with collaborative virtual environments in the fields of archaeology and language learning. School teachers in the USA are also increasingly using [virtual worlds](#) as a [learning support](#) for their classes. The first and largest [virtual public school](#) was set up in Florida in 1997.<sup>19</sup> However, experts and the public are [divided](#) over extending the use of virtual schools in the USA.<sup>20</sup>

## A snapshot of e-learning in the USA

Online learning (i.e. in which at least 80% of the course content is delivered online) is increasingly popular in the USA. A survey (2013) [reveals](#) that the number of American students taking at least one online course now exceeds 6.7 million (i.e. 32% of total enrolments). However, fewer than 3% of higher education institutions currently have a MOOC, while around 9% are in the planning stages. The survey also shows that in the past ten years a majority of higher education institutions (62.4%) have moved from offering online courses to providing complete online programmes. Interestingly, almost 45% of academic leaders believe it takes more faculty time and effort to teach online. This may seem striking, but accounts for the fact that building online courses places additional demands on faculties. On the other hand, for-profit institutions display a very different trend from non-profit and public ones: only 24% consider that teaching online is more time-consuming. The authors of the survey suggest that this may be due to the fact that for-profit institutions have invested heavily in online learning from the outset and they may have balanced the level of effort required more efficiently. Overall, academic leaders are split in their opinions about MOOCs as a sustainable method for offering online courses (with 28% agreeing and 27% disagreeing).

Interestingly, another survey (2011) [shows](#) that the general public and college presidents offer different assessments of the educational value of online courses. Only 29% of American adults consider that a course taken online provides an equal educational value to one taken in a classroom. By contrast, over half of college presidents (51%) take this view.

## E-learning in the EU

[Open Education Europa](#), the EU portal for quality OERs produced in the EU, indicates that in March 2014 there were over 450 MOOCs (see figure 3). Generally, there seems to be a very strong interest in MOOCs in Spain, and also in the United Kingdom, France, and Germany. The **Spanish** [Universidad Nacional de Educación a Distancia](#) has a significant share of the more than 150 MOOCs in Spain. The latest platform – [Miríada X](#) – is designed to facilitate exchanges and cooperation between Spanish and Latin American institutions. The **British** platform [FutureLearn](#), led by the Open University, comprises 26 partners in total, including the British Library, the British Museum and the British Council. In principle, courses on FutureLearn should be free of charge. However, its licensing policy has spurred significant [controversy](#) since it imposes restrictions on modification and retains rights over user content. In France, the Government has launched [France Université Numérique](#), the first **French** digital learning portal. Its MOOC platform is one of the 18 actions in a five-year strategic plan for the digitalisation of learning and teaching in France. The **German** platform for online teaching – [iversity](#) – offers MOOCs in German and English, and has [announced](#) that two higher education institutions from its platform will award [ECTS credits](#). So far, there is not much information available about MOOC development in Eastern Europe.

Press sources [indicate](#) that an increasing number of business schools in the EU are entering

Figure 3 - European MOOCs



Data source: [EU open education portal](#), March 2014.

online education. Interestingly, seven of the [top ten](#) online and distance MBA programmes are offered by European schools. A MOOC offered by the French business school [HEC Paris](#) via Coursera drew over 30 000 students to its debut class '[Understanding Europe](#)', 60% of whom came from outside Europe.

The pan-European MOOC platform [OpenupEds](#) set up by the European Association of Distance Teaching Universities unites partners from 11 countries<sup>21</sup> and currently provides access to over 60 free courses in 12 different languages. The [European Distance and E-Learning Network](#) participates in a wide range of [EU projects](#). It has also proved successful with thematic activities such as the [Open Classroom Working Group](#), and in contributing to research in the field of e-learning.

A growing number of European schools are developing [1:1 computing projects](#) involving mobile devices such as laptops, notebooks, and netbooks (1:1 stands for one device per user). Different communities of practitioners exist at EU level to provide solutions for exchanging good practice. One such example is the [Open Discovery Space](#) which offers an open multilingual learning interface to encourage the adoption of e-learning resources.

### **Funding higher education (or the challenge of doing more with less)**

In accordance with the [subsidiarity principle](#), education and training policies in the EU are a national prerogative. Starting from 2009, the economic downturn and the underlying need to cut back spending led many EU countries to reduce investment in education and training. While the room for manoeuvre was greater for some Member States than others, all shared the same double challenge: prioritising public investment in education and training, while finding more efficient ways to deploy available financial resources. Different models of funding exist across Member States, with a growing number of countries introducing greater cost-sharing into their higher education systems (e.g. between the state, businesses, foundations and alumni, with public investment helping to leverage private sector match-funding). However, the European Commission [stresses](#) that while it is instrumental to choose appropriate funding mechanisms, considerations of efficiency should go in parallel with concerns on equity and access to education. The degree to which EU students are expected to contribute directly to the cost of their studies remains widely [debated](#).

In contrast, American universities, including state universities, have a different economic model: that of private non-profit enterprise. Their income is based largely on student enrolment: students pay for the education they receive, thus the fees depend on the tuition. The [cost of higher education](#) has surged 1 120% over the past 35 years (four times faster than the increase in the consumer price index) and the average amount of student debt<sup>22</sup> when leaving university is at a worrying level. This is not the case in many European countries where tuition fees are generally low or non-existent.<sup>23</sup>

Experts [argue](#) that it is very hard to assess the return on investment from the use of ICTs for learning purposes. They warn that costly investments in educational technologies take funding away from alternative investments in education and it is therefore essential that the return on investment from ICT-based learning be at least as great as alternative forms of educational investment. Advocates of public education in the USA [argue](#) that the shift to full-time virtual-learning schemes diverts funding from public schools and benefits private companies. Business reports [confirm](#) that the recession and state budget cuts in the USA prompted the rapid growth of virtual schools, which in turn acted as catalysts for the [e-learning industry](#). In contrast, in Europe, education still happens very much in a face-to-face context and is set around the role of the [teacher](#).

## Endnotes

- <sup>1</sup> Sixteen Member States [reduced](#) their budgets for education at some point between 2008 and 2011, with six of them implementing further significant cuts in 2012.
- <sup>2</sup> At the same time, the European Commission [stressed](#) in its last three Annual Growth Surveys that continued under-investment in human capital risks eroding the EU's growth prospects.
- <sup>3</sup> In 2010, [ICT expenditure on education worldwide](#) was in excess of €46 billion, showing 2.5% growth even after the financial crisis.
- <sup>4</sup> The European Parliament is currently [discussing](#) measures to further reduce the cost of deploying high-speed electronic communications networks. This is expected to facilitate the deployment of broadband in rural areas and therefore allow citizens in these regions to access e-learning.
- <sup>5</sup> In comparison, 70% of Americans have [broadband access](#), with wide [disparities](#) across regions, racial groups and income levels.
- <sup>6</sup> This conclusion has also been [confirmed](#) by Canadian researchers who found that students prefer conventional lectures over the use of technological devices.
- <sup>7</sup> For example, a Master's degree at Harvard Extension School (offering online courses) [costs](#) less than €18 000, in comparison to over €65 000 for a (traditional) Master's programme at Harvard's Kennedy School.
- <sup>8</sup> Experts [argue](#) that written exams will belong to the past by 2023. Assessments will instead be done in online tests where students sit exams on computers analysing their ability and adjusting the questions' difficulty accordingly.
- <sup>9</sup> Experts [stress](#) that two effects in particular explain the difficulty of measuring the real benefit of a change to a learning process. The 'Hawthorne effect' is a psychological phenomenon that produces an improvement in human behaviour or performance as a result of increased attention. The 'Dr Fox effect' suggests that people tend to give more credit to something that is well presented regardless of the value of the content being presented.
- <sup>10</sup> While open course material is free, the cost of creating an online educational experience is very high. Press sources [indicate](#) that the [William and Flora Hewlett Foundation](#), the principal financial backer of the open educational movement, has spent more than €80 million over the past decade, with more than €10 million going to MIT.
- <sup>11</sup> However, in 2011, the [African Virtual University](#) (AVU) released 219 modules in English, French, and Portuguese under the Creative Commons licence. AVU is a Pan-African intergovernmental organisation set up by 14 African governments.
- <sup>12</sup> However, it has been [reported](#) that the American Council for Education has accepted 11 courses for credit – five from Coursera, five from Udacity and one from eDX – and will continue to review and externally quality assure them.
- <sup>13</sup> For some examples within the EU, see section on e-learning in the EU on page 6.
- <sup>14</sup> Creating a MOOC platform requires considerable resources. The initial funding for eDX [amounted](#) to over €44 million.
- <sup>15</sup> The [reason](#) for this probably lies in the fact that tuition fees in the USA have [skyrocketed](#) in recent years and one of MOOCs' main drivers is to cut costs (see also section on the funding of higher education on page 6).
- <sup>16</sup> However, MOOC platforms are increasingly under pressure either to transfer costs to course participants or to generate income from other sources. Experts [stress](#) that xMOOCs are tempted by the 'freemium to premium' business model, which offers services and products that are initially free, but once a consumer base has been established, a fee is then charged for advanced or additional services and products.
- <sup>17</sup> A MOOC at Stanford University – [Introduction to Artificial Intelligence](#) – drew worldwide [enrolment](#) of over 120 000 students.
- <sup>18</sup> Specialists warn that spending an excessive amount of time in front of a computer can harm the [eyes](#), cause [obesity and negatively affect the back and wrists](#).
- <sup>19</sup> The [Digital Learning Bill](#) passed in Florida in 2011 requires students entering the ninth grade in 2011-12 to complete at least one online course and plans that all end-of-course assessments will be administered online by 2015.
- <sup>20</sup> Experts [recommend](#) that the growth of virtual schools is slowed down until there is sound evidence on their performance.
- <sup>21</sup> It has university partners in France, Italy, Lithuania, the Netherlands, Portugal, Slovakia, Spain, UK, Russia, Turkey and Israel. Courses are available in all of the countries' native languages, and Arabic.
- <sup>22</sup> Currently 40 million Americans hold [student debt](#) which in 2012 surpassed €700 billion in total. Two-thirds of students graduating from universities and colleges have some level of debt, and one in ten [accumulates](#) more than €29 000.
- <sup>23</sup> Experts [stress](#) that the importance of public funding and different policies on tuition fees probably account for the lower interest in and take-up of MOOCs in the EU. Similarly, the different approach to higher education led the European Students' Union to [request](#) that education be excluded from negotiations on a Transatlantic Trade and Investment Partnership.

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