

Arthur D Little

The future of higher education

Transforming the students of tomorrow



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Executive summary

Global higher education (HE) is a \$3 trillion-per-year market that is expected to grow at 9% annually over the next five years.¹ This market is transforming rapidly, with nine major trends changing the educational landscape and posing challenges for universities that wish to remain competitive:

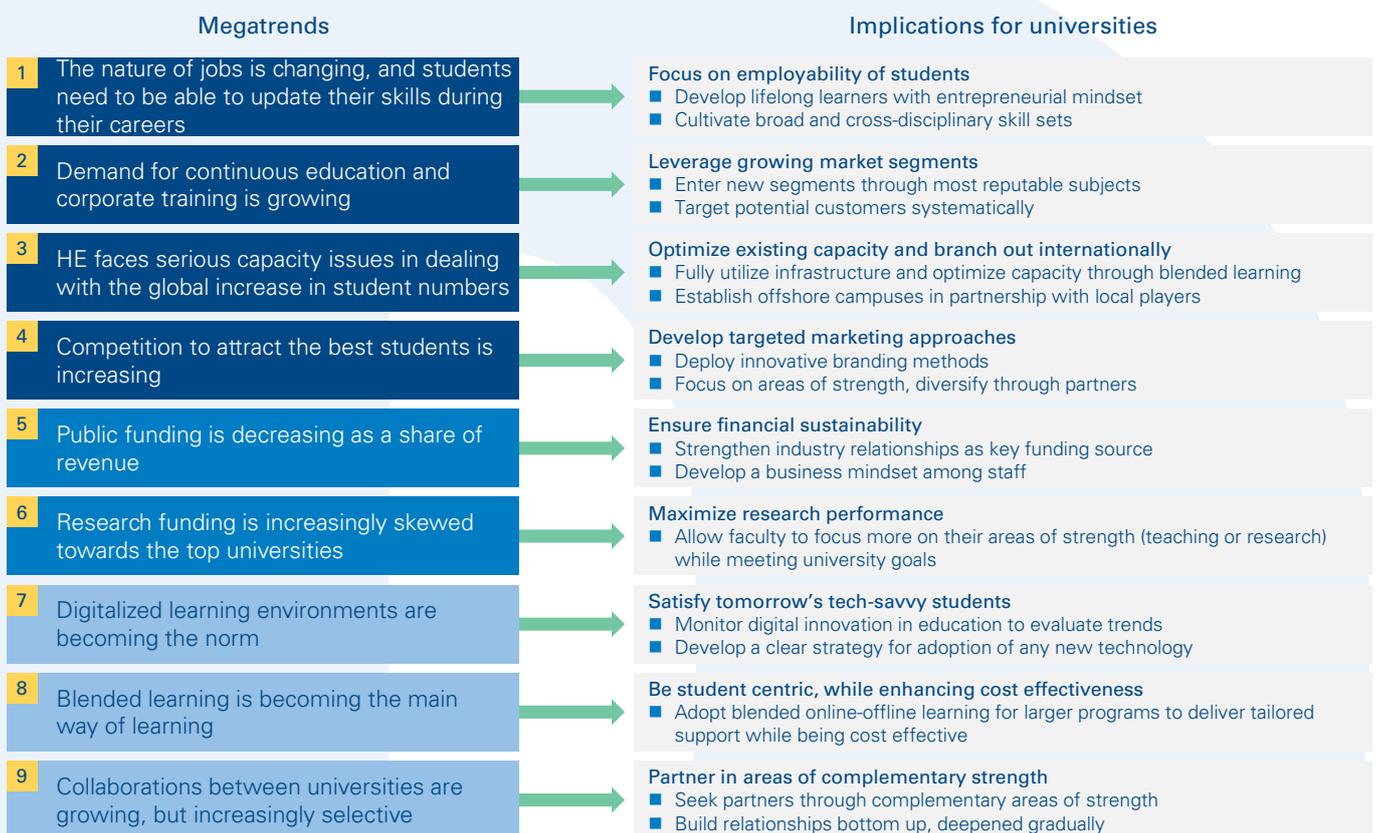
- 1. The nature of jobs is changing, and students need to be able to update their skills throughout their careers.** Students prioritize employability when selecting universities, but many future jobs are not yet defined. To ensure that students can succeed in the future, universities must equip them to be lifelong learners who can acquire new skills and give them broad, cross-disciplinary problem-solving skills and entrepreneurial mindsets.
- 2. Demand for continuous education and corporate training is growing.** Universities without strong brands and presence in this area should build strength in a targeted, step-by-step manner. Initially they should offer courses only in disciplines they are best known for, and ideally in segments that are comparatively uncrowded. Alumni and those who are already familiar with the university's brand should be initial priority targets. Company sponsors can also be leveraged to support branding efforts.
- 3. HE faces serious capacity issues to deal with the global increase in student numbers.** For example, one university is being built per week in China to support the growth in HE demand. To cope with this rapidly growing demand and related capacity issues universities need to fully utilize and optimize their existing infrastructures, and should consider expansions through international branches via local partnerships.
- 4. Competition to attract the best students is increasing.** Universities will need to compete to attract the best students on a regional and global scale. Universities should make use of alumni networks, international school visits and diversification through partnering to strengthen their brands and optimize resource allocation, as well as leverage positions of relative strength.
- 5. Public funding is decreasing as a share of revenue.** To remain financially sustainable, universities must effectively offer services to industry, including consultancy and delivery of co-developed curricula. They should also consider leveraging innovative financing models such as public-private partnerships – and private equity investments. To be effective, this needs a strong business mindset, well-structured processes and a dedicated IP licensing office.
- 6. Research funding is increasingly skewed towards the top universities.** To stay competitive and maximize overall performance, universities should allow some staff to focus on either research or teaching, depending on their particular strengths.
- 7. Digitalized learning environments are becoming the norm.** To maximize tech-related efficiency gains universities must understand innovation in education and have strategies to best respond to the latest digital trends with potential roles in education, such as augmented reality and artificial intelligence (AI). New infrastructure and systems should be set up through partnerships with reputable providers to ensure data security and sustainability.
- 8. Blended learning is becoming the main way of learning.** Leading universities are adopting new online-offline blended teaching models, such as the “flipped classroom” and massive open online courses (MOOCs). These support student-centricity, provide for a personalized and adaptive learning experience and enhance the cost-effectiveness of large programs.

¹ IBIS Capital, 2012. Global e-Learning Investment Review. Arthur D. Little analysis

9. Universities are collaborating more but increasingly selective. New collaborations are best built bottom-up through staff collaboration, then gradually deepened by formal support. Universities should seek out “better-ranked” partners, working in areas of complementary strength.

Overall, although robots will not replace lecturers and conventional lecture theaters will still exist, the higher education environment will change significantly over the next 15 years, as summarized in Figure 1. All universities wishing to remain competitive will need to manage this change effectively.

Figure 1: The nine educational megatrends and implications for universities



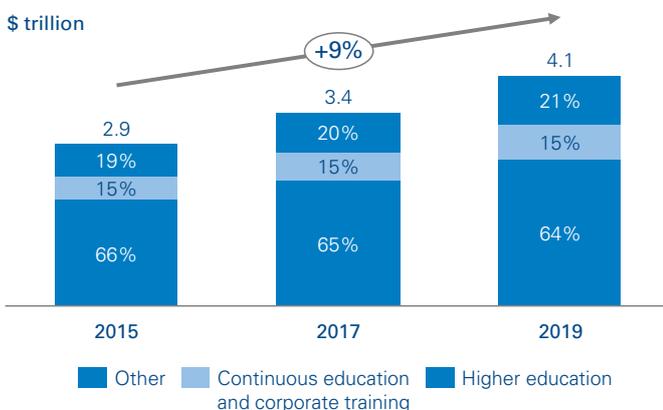
Legend: Students and skills Funding & research Teaching models

Source: Arthur D. Little

Higher education megatrends and their implications for universities

The global higher education (HE) market is worth almost \$3 trillion per year and expected to grow by 9% p.a. to over \$4 trillion by 2019 (Figure 2).

Figure 2: The global education market



Source: IBIS Capital, 2012. Global e-Learning Investment Review. Arthur D. Little analysis

The traditional student-lecturer relationship is changing, and over the coming years, nine megatrends will disrupt the market and HE as we know it. Whilst lecture theaters and seminar rooms will still exist and robots will not replace lecturers, the playing field is shifting significantly and becoming increasingly competitive. This is driven by changes in future skills requirements, students' economic expectations from HE investment, changes in funding and research, the use of more effective teaching models and new technologies.

Universities need to anticipate these trends and find innovative solutions to transform their business models to stay ahead. For some, there is a steep learning curve ahead – acting now will enable some organizations to progress on the learning curve and make the gradual changes in their strategies and infrastructures to avoid being radically disrupted in the future.

Arthur D. Little has observed nine megatrends in Higher Education and drawn out their implications for universities in this report.

The nature of jobs is changing, and students need to be able to update their skills during their careers (1)

Employees are changing jobs more frequently. Twenty years ago, it was common for a US employee to stay in one job for 20 to 25 years.² Now the average time spent in one job is about 4.5 years and employment duration is likely to shorten further.³ Staff increasingly moves between sectors, and new job types are created.⁴

At the same time, some of today's jobs are under threat. In the US, up to 47% of jobs are at risk due to automation, with EU estimates ranging from 45% to 65%, depending on the country (see Figure 3), though recent evidence suggests that some of the early estimates on job losses from automation may have been overstated as software and machines struggle to handle aspects of the work that requires human contact.⁵

This will increase the stakes in making the best selection for higher education, with employability an increasingly important factor. As over one-third of the core skills of 2020 are yet to be identified,⁶ it is impossible to equip students with concepts sufficient for long-term success. HE providers are also typically not interested in taking a long-term perspective unless it attracts students.

Employability is increasingly important to students when selecting universities – particularly in professional education. This is highlighted in the Financial Times Management Education rankings, for example, as outlined in Box 1.⁷ With the rising stakes for employability, we expect that rankings with stronger emphasis on research will also highlight such student-based criteria.

² CNBC, 26 March 2013. Is it time to quit your job?

³ United States Department of Labor, 18 September 2014. Employee Tenure Summary

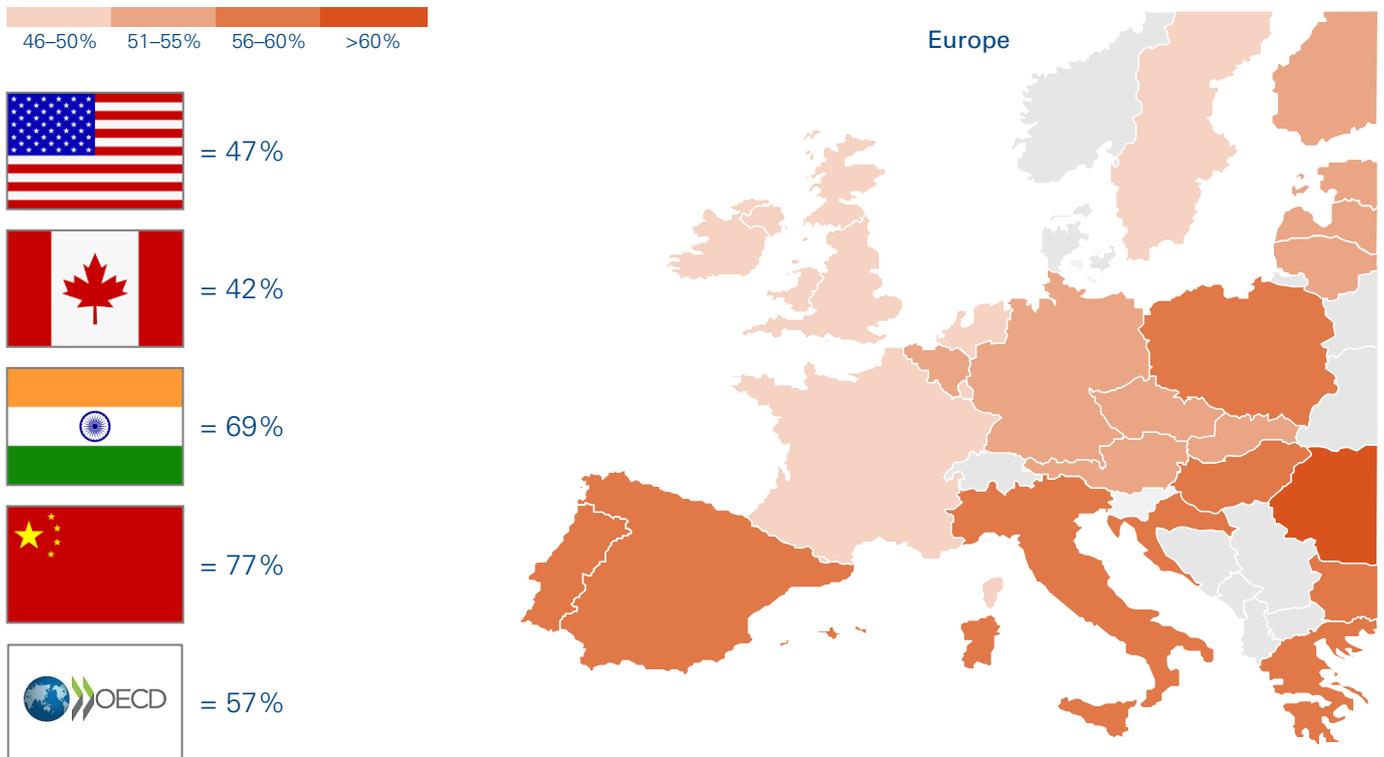
⁴ University of Kent, 2016. Future Jobs

⁵ The Economist, 4 June 2016. I'm afraid I can't do that

⁶ World Economic Forum, January 2016. The Future of Jobs, Skills Stability

⁷ Financial Times, 13 September 2015. Masters in Management 2015 methodology

Figure 3: Percentage of jobs vulnerable due to computerization/automation across Europe and the US



Source: Statista, Aug 12, 2014. Technological Advances Place Old Jobs at Risk. Oxford University, Michael Osborne, 2013. The Future of Employment: How Susceptible Are Jobs to Computerisation? Arthur D. Little analysis. CBC News, June 2016. 42% of Canadian jobs at high risk of being affected by automation, new study suggests. FT.com, January 2016. Rise of the robots threatens the poor

Note: Proportions for Europe and the US are different

Box 1: The importance of research and teaching in global rankings

As competition for jobs gets fiercer, students will become increasingly competent in assessing their investment in higher education. In the future job market, ensuring that they will be able to get jobs after graduation will be more important than academic acknowledgements.

MBA students have always been more oriented towards the impact of education on their careers, which is reflected in the components underlying the rankings of MBA programs outlined below. On the other hand, traditional graduate rankings mainly focus on research-related criteria.

Weighting given to research/non-research related criteria



1) Including parts of component teaching environment that are based on results from Academic Reputation Survey, as these are based on perceptions from academia (15% weight)
 2) FT Global MBA ranking 2016

As graduate and undergraduate students become more demanding investors in education, their choice criteria are likely to increasingly resemble the criteria of MBA students. Until this is reflected in the rankings, universities will have to find innovative ways of providing similarly “objective” evidence for the quality of their education.

Implications for providers of higher education

Box 2: Definition – Problem-based learning

Problem-based learning is a method of constructing and teaching courses by giving students problems to solve. Students start with stimulus material that leads them to a problem, rather than the display of disciplinary knowledge itself. The aim is for students to acquire such knowledge and skills through solving the problem, often undertaking this in teams. Limited resources are typically provided for guidance.

HE providers can take three actions to emphasize the importance of students' employability. First and foremost, universities should develop their students into lifelong learners with the ability to "self-reskill" and renew their knowledge bases regularly. Business strategist Arie de Geus argues, for example, that "the ability to learn faster than your competitors may be the only sustainable competitive advantage."⁸ A proven approach is to adopt problem-based learning strategies (Box 2) that build critical-thinking and independent solution synthesis skills. Some universities and colleges have already applied this successfully (See Box 3 for examples). Seamless integration across the whole academic cycle is also starting to surface – with interaction in secondary schools to ensure the transition from school to university is smooth for students.

Box 3: Best practice – Problem-based learning

Olin College allows students to choose any course of interest, along with a small number of core courses, and actively promotes interdisciplinarity through special projects and co-curricular activities recognized on students' report cards. The college also gives students exposure to solving real-life problems in teams as part of their problem-based learning approach, some of which are undertaken together with corporate partners.

Second, HE providers should equip students with wider sets of skills across disciplines. In the US, such a system already exists with majors and minors, and interdisciplinarity is also increasingly common in the UK⁹ and South Korea, through "fusion majors," for example. Interdisciplinarity can also be achieved through partnerships with other universities and

organizations, through the types of dual degrees offered by partnerships such as the Global Alliance in Management Education (CEMS), or the IO-MBA program, which emphasizes partnerships with international organizations.¹⁰

Third, universities should seek to update their curricula in a timely manner if new industry trends are observed, for example in the area of smart data. This allows them to keep lectures up to date with current developments in the business world, and provide the most up-to-date education possible.

Fourth, HE providers should actively foster an entrepreneurial mindset in students to build their independence, resilience and proactiveness. Some HE institutions promote the set-up of businesses within campus, with support and practical training provided by an entrepreneurship center. However, not all such facilities are comprehensive and tailored to students' needs, and actively encourage a high level of entrepreneurial activity.

Box 4: Best practice – Entrepreneurship

In Sweden, five renowned academic institutions (Karolinska Institute, Stockholm School of Economics, Royal Institute of Technology, Stockholm University, and Konstfack), all active in complementary fields, collectively founded the Stockholm School of Entrepreneurship as an academic facility in the area of innovation and entrepreneurship, offering courses, informal training and support to students.

Demand for continuous education and corporate training is growing (2)

Similarly, the rapidly changing career patterns described earlier are driving the growing importance of continuous education and corporate training. This sector of the global education market is currently worth beyond \$400 billion¹ and expected to grow on average by 10% each year until 2019¹ – and at even higher rates after 2019 – driven by two trends.

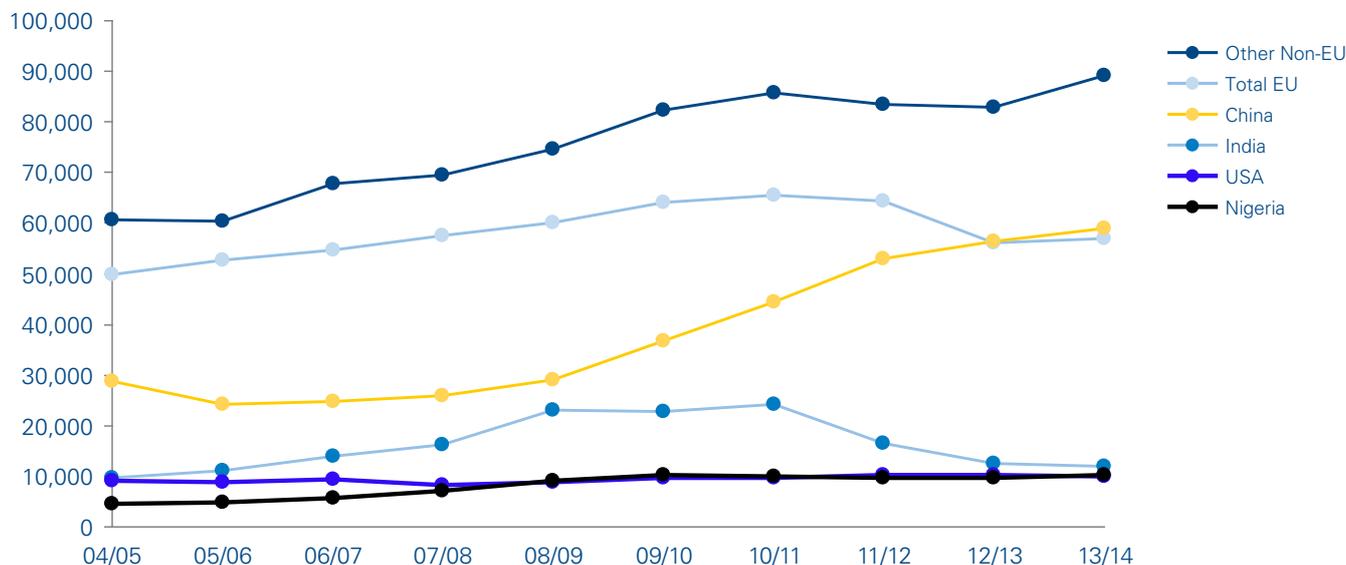
First, companies are increasingly addressing their skills gaps by training existing staff.¹¹ Second, the growing frequency of job and career changes is driving up demand for short practical courses. Part of this demand will be satisfied through e-learning, which is particularly prominent, and blended learning.

8 Harvard Business Review, March 2016. Learning to Learn
9 Telegraph, 1 June 2014. Universities to Offer US-style 'Major and Minor' Degrees

10 Previously Community of European Management Schools (CEMS). The IO-MBA program is led by the University of Geneva where students have the opportunity to spend some time at an international organization, NGO or the private sector

11 Forbes, 4 February 2014. Spending on Corporate Training Soars: Employee Capabilities Now a Priority

Figure 4: Number of first year non-UK domicile students in the UK



Source: HESA Student Record, Arthur D. Little analysis

Implications for providers of higher education

While continuous education and corporate training are likely to offer real opportunities for some institutions, gaining momentum for “new” universities without a wide presence in the sector will remain a challenge because of the number of existing players and the marketing investments required to gain a foothold. Presently, most corporate training occurs within the executive education area and is provided by business schools or dedicated training institutes.

To successfully enter this market without a reputable brand in this area, universities should take a step-wise approach. At the outset, we recommend focusing on courses in areas of particular strength (e.g. subjects or fields in which they enjoy particular recognition), ideally in segments of education that are comparatively uncrowded and where there is still room to maneuver (e.g., executive education would be a challenging entry point). Alumni are likely to be strong targets for this type of training as they already understand the capability and branding.

At the same time, universities may benefit from corporate co-branding of specific master’s programs hosted for company employees and others. For example, Real Madrid co-brands a master’s in sports management with Universidad Europea.

HE faces serious capacity issues in dealing with the global increase in student numbers (3)

Population growth will be a key challenge for the HE sector. By 2035, 520 million students are expected to be enrolled in higher education worldwide, growing more than five-fold from around 100 million in 2000.¹² To put it into context, the OECD Education Director mentioned that China is constructing one university per week to address increased demand, and other sources also highlight the need for universities to be constructed at a rapid rate to support growth in HE demand.

The Chinese middle class will likely be the primary driver of the rapidly growing demand for HE in the coming decades (+300% increase by 2030).¹³ Increasing internationalization of universities, with a growing share of foreign students, is putting pressure on the HE system, with some countries disproportionately affected. The UK, for example, has seen a sharp increase in Asian students over the past decade (See Figure 4). Severe capacity issues are anticipated, unless effective plans are put in place in the near future.

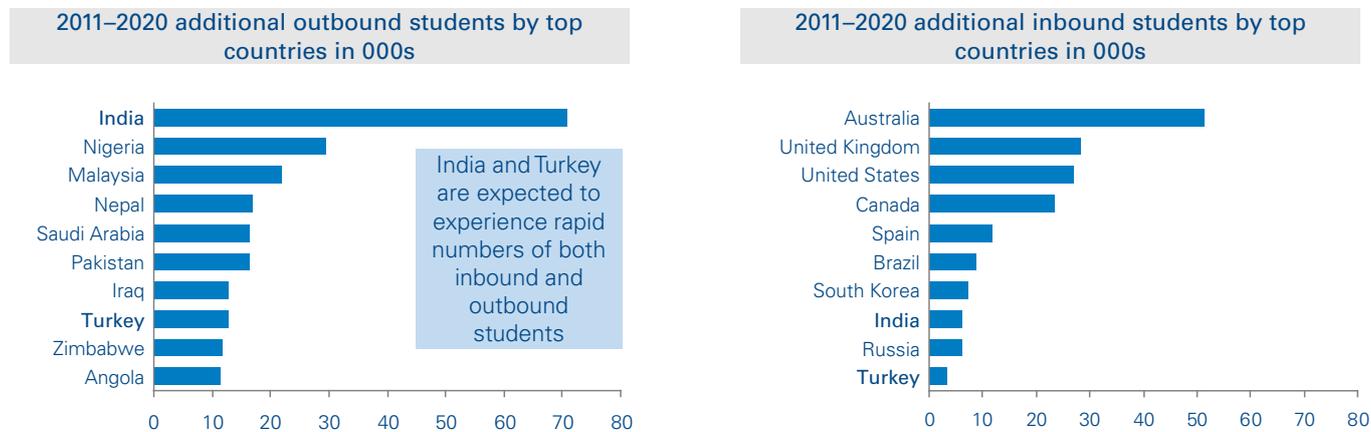
Implications for providers of higher education

To cope with increasing pressures on capacity, HE providers should fully utilize and optimize existing facilities and expand selectively where beneficial.

¹² University World News, 2 September 2012. Massification continues to transform higher education

¹³ OECD Education Director, March 2016. China opens a new university every week. Article hosted on the BBC

Figure 5: Countries with largest additional outbound and inbound students from 2011-2020



Source: British Council, 2012. Going Global: The shape of things to come: Higher Education global trends and emerging opportunities to 2020. Arthur D. Little analysis

First, HE providers should consider making the most efficient use of existing infrastructure. For example, classes could be run continuously (without summer or winter breaks) to maximize utilization. Some students (e.g. those studying part-time) could attend physically during times when other students are away and accessing courses online. While some universities already utilize facilities during summer break as part of summer school programs, such as the London School of Economics, this is still uncommon.

In addition, HE providers should consider delivering parts of the courses online through blended learning approaches, with an aim to reduce the strain on the physical infrastructure. This is further discussed as part of Trend 8 later in this document: *“Blended learning is becoming the main way of learning”*.

Second, HE providers have the opportunity to selectively expand their capacity to benefit from the rapidly increasing demand. As growth in demand is largely driven by Asia, universities could export their brands to Asian markets. Stanford’s campus in Beijing, New York University’s campus in Abu Dhabi, and the University of Nottingham’s campus in Ningbo are among the most commonly known. However, while the number of branch campuses is increasing, not all are successful. Transnational campuses are subject to alien institutional impact and host government priorities, and a key success factor is partnering with local stakeholders.

Competition to attract the best students is increasing (4)

Education providers are finding it increasingly difficult to attract the best students. Attracting the best students is important because of university branding and image, and as many universities strive to be the best, one key component of this is the caliber of their students. However, attracting the best students is increasingly difficult because of two main drivers. First, student mobility is rising¹⁴ – the number of international students is expected to grow from 4.5 million to around 7.5 million by 2025.¹⁵ In the UK international students already make up almost 20% of the student population (academic year 2014/15).¹⁶ Universities are now competing on a regional and often even global scale to attract the best students. The UK, for example, is also actively encouraging increasing competition. A new teaching excellence framework is being implemented, recognizing “high-quality teaching” formally and allowing those institutions to charge higher fees to students from 2017.¹⁷

Some countries, such as India, will see especially high numbers of students going abroad to study, while others are expected to observe an increased net reception of inbound students – both are outlined in Figure 5. Students often first select what country they wish to study in before choosing the institution.¹⁴ This means that universities in unattractive geographic locations will find it difficult to attract students, and to attract and retain professional talent.

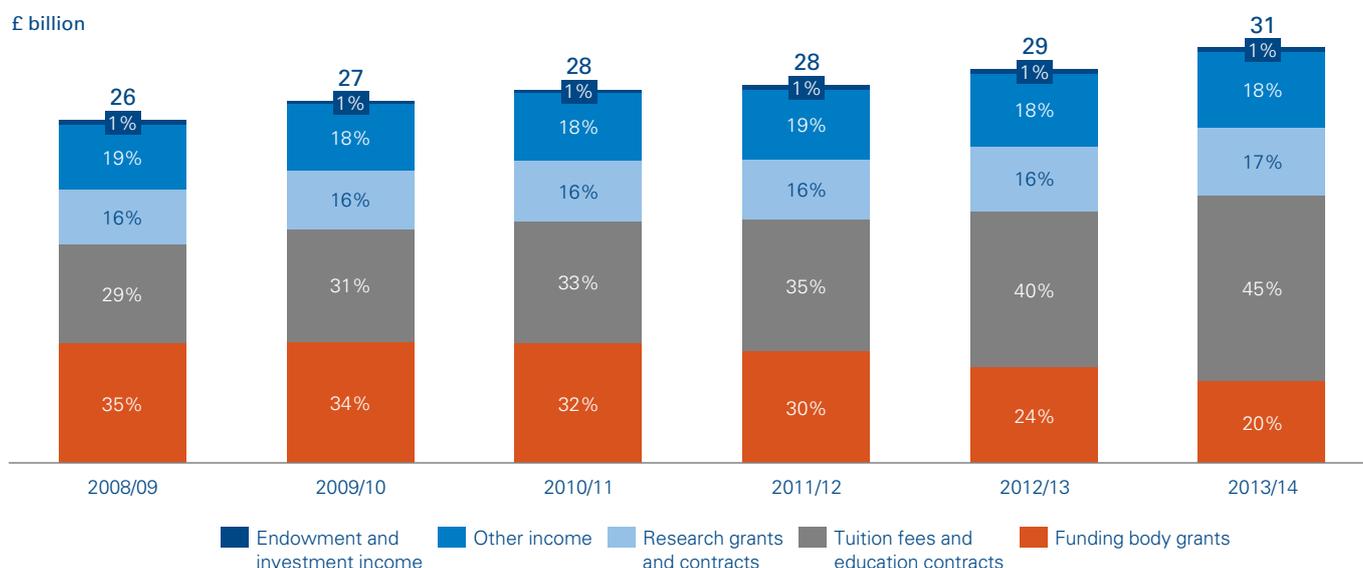
14 British Council, 2012. Going Global: the Shape of things to come. Higher Education global trends and emerging opportunities to 2020

15 The Economist, 30 January 2016. Brains Without Borders

16 UK Council for International Student Affairs, 2016. International student statistics: UK Higher Education

17 BBC News, 16 May 2016. Plan for higher university fees for better teaching

Figure 6: Income of UK higher education providers



Source: Higher Education Statistics Agency, 2015. Finance Statistics Record 2013/2-14. Arthur D. Little analysis

Being able to attract international students is not only beneficial from a sustainability point of view, but as regulations on fee levels typically only apply to locals, there is also an economic incentive. For example, basic education in some EU countries, such as Sweden or Norway, is free for their citizens (and EU citizens as a result), but they are able to apply relatively high fees to non-EU citizens.

Some countries have set strong goals to attract more internationals as a result, such as Japan, which is aiming for an additional 60% of international students by 2020.¹⁴

In addition, a number of newer players across the globe are using completely new approaches and gaining wide international recognition, increasing competition with existing traditional players. This includes Nanyang Technological University, inaugurated in 1991 (13th best university worldwide, according to the QS ranking) and Olin College, established in 1997. A number of countries, including Singapore, the UK, the US, South Korea, Germany and Austria, are experiencing disruption by players established after the 1970s.

Implications for providers of higher education

Universities should enhance their branding efforts and carefully position themselves to respond to increasing competition for the best students.

First, branding is key to gain awareness, in particular among international students. One approach is to leverage the alumni network. Another method is for marketing or recruitment staff to visit students abroad, which is increasingly common. Best-practice examples of this approach are outlined in Box 5.

Box 5: Best practice – Branding

Delft University of Technology uses previous international students to act as alumni brand ambassadors in their home countries. These former students offer to discuss their experiences with students who are considering studying at Delft.

The University of Miami takes another approach to branding. It places strong emphasis on its staff visiting students abroad with aim of attracting them to the institution. Around 65 countries are covered through this approach each year.

Second, universities should carefully position themselves in an increasingly competitive global market. Smaller education providers are finding innovative ways to remain competitive. Fusions and different forms of cooperation and collaboration are strategies deployed to either reinforce a narrow niche focus or broaden the offering. Another aspect of positioning is to emphasize differentiators in which the university has a strong reputation.

This is particularly relevant for smaller universities that are not on a level playing field with the global top 50. These institutions should focus on their core areas of strength and leverage partnerships if aiming to diversify their offerings. Universities also need to assess the sustainability of their existing programs, in order to focus on programs that are profitable or of strategic importance (either to them or to the skills development of the country as a whole). Programs that do not fit these criteria should be phased out.

Third, to attract international students, universities need to offer more degrees and courses in English, which is increasingly seen across universities in Europe, for example.

Public funding is decreasing as a share of revenue (5)

Public funding for universities is declining, in general, while costs are rising – in both absolute and relative terms. As shown in Figure 6, funding grants in the UK declined as a percentage of revenue from 35% to 20% between 2008 and 2014.¹⁸ We observe a similar trend across many other countries. In the US, for example, state funding has decreased from over 30% to just above 20% as a percentage of revenue in the past 10 years and US states are spending, on average, 23% less per student than pre-2008 recession levels.¹⁹

Revenue through tuition fees is increasing, driven by both increased student fees and higher student numbers. For example, in the UK, institutions with “high-quality teaching” will be able to charge more, as mentioned above¹⁶, and the MBA program at McGill University more than tripled its program cost without an adverse effect on student numbers.²⁰ However, this will not be enough to cover the steep decline in public funding. We see an increasingly pressing need to diversify the funding base.

This has induced some universities to turn to innovative funding models, such as the public private partnership model (PPP), to leverage private funds to finance one-off projects or ongoing programs. In 2015, education was the most active sector in terms of PPPs in Europe by number of deals, and the third largest in value terms.²¹ PPPs hold multiple advantages for universities, enabling faster development through easier access to (non-debt) capital, as well as opportunities to improve ties to industry.

For instance, the University of Toulouse initiated a PPP to renew the infrastructure of its campus (a 27-year contract for EUR 202 million). In 2013, the University of Hertfordshire, UK, announced²² a GBP 190 million PPP program to design, build and operate a new student accommodation facility, including associated social spaces and infrastructure.

In addition, private equity is consistently taking a larger role in education, with over 250 private equity firms in the US alone holding stakes in education.²³

Implications for providers of higher education

A number of actions can ensure long-term financial sustainability, all relating to developing industry relationships into a more significant funding source.

First, the licensing of intellectual property is an opportunity for all universities with strong technical focus. Many see this as an “underused resource for generating income.” To realize this income, however, universities need to emphasize applied research and set up offices to manage the activity.

Second, consultancy services can be offered to industry. A business mindset among faculty, including effective proposal writing and work delivery, is crucial for success. For example, Delft University of Technology staffs its industry liaisons office with professionals and ex-consultants from companies such as Shell and Siemens, who can “speak the language” of major companies and write research proposals that will appeal to them.

HE providers need to offer timely and context-relevant analyses and insight that directly answer their clients’ questions, which is not always the case with research conducted for academic audiences. One way to develop this skill in the faculty is to incentivize them to undertake regular industry assignments, in order to ensure that they remain attuned to the world outside academia and counteract the traditional academic perception that applied research is not as worthwhile.²⁴ Universities need to market themselves proactively to companies, but often only spend 1% of their revenue on these types of activities.²²

Some academic institutions use a key account management approach to engage with clients, identifying client needs and coordinating business plans, with account managers being selected for their strong relationships with particular companies and their subject matter expertise. Alternatively, industrial liaison officers are sometimes used to engage with multiple clients.

Third, HE providers should look to explore innovative financing models, such as the public-private partnership model (PPP), and consider leveraging investments by private equity firms where appropriate.

18 Adopted from IBIS Capital, published in Education Week, 7 February 2013. Global Education Market Tops \$4 Trillion, Analysis shows

19 Center on Budget and Policy Priorities, 1 May 2014. States Are Still Funding Higher Education Below Pre-recession Levels

20 Financial Times, 1 May 2016. Rising MBA tuition fees fail to damage demand

21 15 deals were closed accounting for some EUR 1.5 billion - European PPP Expertise Centre

22 InfraPPP, 3 June 2016. Financial Close for University of Hertfordshire PPP Project

23 ICEF Monitor, 12 February 2014. Money talks: major private investments in education reflect expectations for further growth ahead

24 The Guardian, 4 October 2011. Why Universities Must Optimise Third Stream Revenue Opportunities

Lastly, HE providers should seek industry to contribute to the design of teaching curricula for selected programs, with the aim of attracting funding in return. Companies benefit as they can ensure that students are equipped with job-relevant skills during their studies, while students gain exposure to the corporate world and universities attract additional funding. Box 6 highlights an example of a university successfully leveraging industry funding.

Box 6: Best practice – Industry relations

The Norwegian University of Science and Technology (NTNU) has successfully leveraged industry involvement. Some of its departments, such as Petroleum Engineering and Applied Geophysics, obtain around 40% of their funding from industry. This department hosts a specialist research center, for example, working with a number of renowned companies including Statoil, TOTAL, BP, ENGIE (formerly GDF Suez), Petrobras and IBM.

In addition, the university has a dedicated Technology Transfer Office (TTO), which assesses R&D for commercialization potential and provides adequate resources to selected projects. This includes negotiating license agreements and the set-up of start-up companies.

Research funding is increasingly skewed towards the top universities (6)

The HE institutions with the “best” research quality are receiving a growing proportion of research funding, while others increasingly lose out with both public and industry funding. In the UK, for example, 75% of funding by research councils is allocated to the top 20% of HE institutions, which gain an increasingly large share of funds.²⁵ The EU also uses R&D excellence as the main criterion to allocate funding for its Horizon 2020 program,²⁶ a EUR 80 billion framework program for research and innovation spanning from 2014 to 2020.

Research strength, aside from attracting more funding, also builds international recognition and prestige, which has many collateral benefits, such as attracting top teaching staff, other top researchers, and the brightest students. This prestige is expressed through the global rankings, which are currently research focused, as outlined in Box 1 previously, and other research awards, including Nobel Prizes.

While teaching is a core mission of most institutions, and though research and teaching “must come together”,²⁷ we expect the rankings to give increasing weight to non-research criteria in the future. The link between excellent research and high-quality teaching is at best unclear, as outlined in a number of academic papers. For example, joint research by the University of North Carolina and Western Sydney University previously found that “the relationship [between research and teaching] is zero”.²⁸ Others take this a step further, such as Northwestern University in Chicago, which argues that there is “consistent evidence that students learn relatively more from non-tenure line professors in their introductory courses”,²⁹ i.e. those with lower research loads. Overall, this means that universities can increase both their research and teaching performance by allowing staff to focus more on their individual strengths in either research or teaching.

Implications for providers of higher education

To maximize performance, universities should allow individual faculty members to focus slightly more on their areas of strength in terms of research versus teaching. A disconnected “two-tier system”³⁰ should be avoided, however – i.e. new recruits should not be researchers or lecturers only. This approach allows performance optimization, as teaching and research require different skill sets, and it is unlikely that every member of the faculty is equally good at both.

As a result, if faculty can spend slightly more time on their area(s) of strength, the overall outcome is likely to be better. Such flexibility needs to be carefully managed, however. In particular, the degree of flexibility needs to be carefully defined to give the right overall capacity balance between teaching and research activities within an appropriate performance assessment system.

Digitalized learning environments are becoming the norm (7)

Growth in digital technology, as seen in Figure 7, is also impacting the market for HE. Students increasingly expect strong digital infrastructure, and this is becoming a larger part of their learning and university experience. This trend manifests itself in a number of ways.

First, the “basics” of high-speed internet on campus, along with an online platform on which students can check grades and obtain and submit assignments will soon be the norm. All

25 Times Higher Education, 22 February 2015. Research Funding Formula Tweaked After REF 2014 Results

26 Conférence des Présidents D’université, March 2014. Mémento des Programmes Européens 2014-2020 pour l’Enseignement Supérieur, la Recherche et l’Innovation

27 The Carnegie Foundation for the Advancement of Teaching, Ernest L. Boyer 1990. Scholarship Reconsidered: Priorities of the Professoriate

28 University of North Carolina and University of West Sydney

29 National Bureau of Economic Research, Figlio, Schapiro, Soter, September 2013. Are Tenure Track Professors Better Teachers?

30 For example as part of one of the OECD’s Four Future Scenarios for Higher Education, 2008

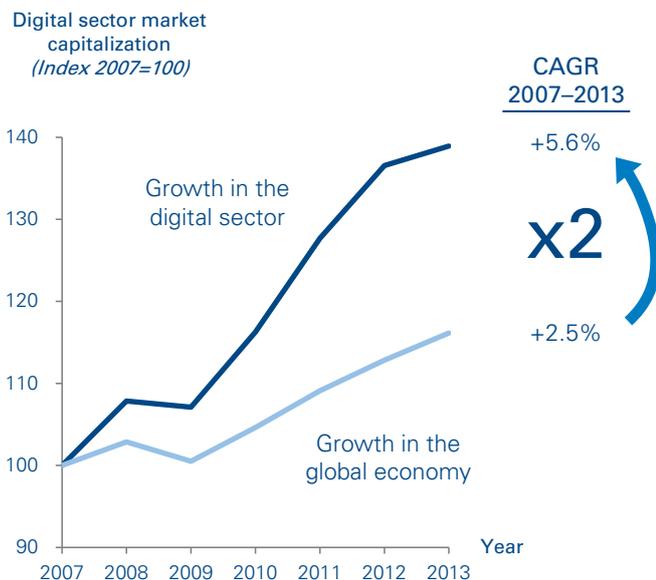
reading materials will be digitalized, which already represents around 35% of UK publishing revenues, for example.³¹

Second, the future learning experience will be considerably enriched by digital devices, such as OLED³²-based foldable lightweight displays for note taking³³ and multi-touch LED screens for support in class group exercises.

Third, virtual experiments and field trips through augmented reality will become widespread. As part of the former, students can undertake experiments in a safe environment and at a low cost, although virtual experiments are unlikely to fully replace the need for “real” experiments. Virtual field trips will provide students with 3D interaction. For example, students could participate remotely in a visit to an oil rig on the other side of the world in real time.

Fourth, robots will increasingly support both lecturers and students. IBM’s Watson is already able to analyze students’ answers to exam questions in real time. While it is unlikely that robots will fully replace lecturers,³⁴ a wide uptake of robots as teaching support is nonetheless expected, as prices decrease and as robots become more socially acceptable. While humanoid robots are already socially accepted in Japan, for example,³⁵ this is not yet the case in many other countries.

Figure 7: The rise of digitalization



Source: IMF, Thomson Reuters, Swedish Agency for Growth Policy Analysis, Arthur D. Little analysis

Implications for providers of higher education

As digitalization significantly changes the learning environment, universities need to have clear response strategies. In particular, they should regularly assess digital innovations with potential impact on the HE sector, such as by a specific task force that could approach the topic by benchmarking other universities regarded as successful first movers, and by undertaking a regular high-level market scan.

If a decision is made to implement a new technology, the university can benefit from pairing up with an established digital education platform provider such as Pearson or Cengage Learning. As expertise in advanced system architecture building and deep knowledge of data security is crucial for credibility, building an in-house system is not recommended.

Blended learning is becoming the main way of learning (8)

The blended learning/smart education market, i.e. a mix of traditional learning methods with digital learning methods and technology, is expected to grow by almost 25% per year, reaching \$447 billion by 2020, and include education products, applications, and learning modes.³⁶

As part of blended learning approaches, students increasingly build their knowledge outside the traditional lecture theatre and seminar room environment,³⁷ e.g. through online research and exercises. Lecture theaters and seminar rooms are, in fact, becoming a place to work together and discuss concepts and ideas with peers, and to get guidance from the faculty.

One such increasingly common learning method is often referred to as a “flipped classroom,” outlined in Box 7. This approach is sometimes combined with gamification concepts.

Box 7: Definition – Flipped classroom

In a flipped classroom, the traditional lecture is held in a video format that students watch as part of pre-homework before joining the class. For example, a student can view a recording of their respective lecturer explaining a certain theory in a lecture-type environment. Class can then focus on the homework – i.e. students solve problems in teams and hold discussions, guided by the lecturer. This approach can be combined with learning analytics to provide for an enhanced and personalized student experience.

31 The Publishers Association, 8 May 2015. Latest PA Figures Show Digital Innovation Driving Publisher Revenues
 32 OLED = a organic light-emitting diode (a type of LED)
 33 Education Week, 4 September 2015. New OLED Findings More Flexible Lighting Technology Towards Feasibility
 34 Michael Powell, iQ Intel. Robot Teachers in the Classroom
 35 Guardian, 31 December 2015. Erica, the ‘most beautiful and intelligent’ android, leads Japan’s robot revolution

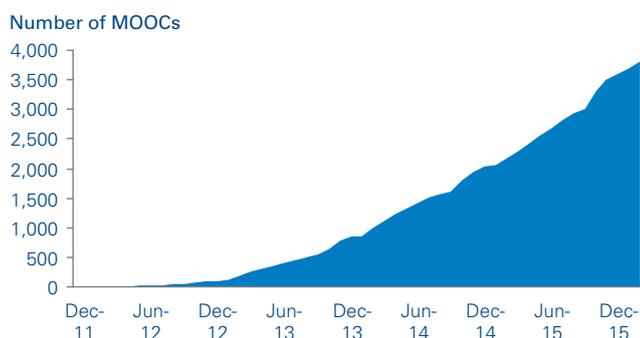
36 Research and Markets, June 2015. Smart Education and Learning Market by Hardware, Software, Educational Content, Learning Modes, User Type, & Region – Global Forecast to 2020
 37 IBIS Capital, January 2013. Global e-Learning Investment Review

Box 8: Definition – MOOCs

Massive open online courses are a type of open-access courses undertaken online. MOOCs are typically hosted on platforms of third-party providers such as Coursera and edX. MOOCs emerged around 2011 and traditionally allowed unlimited participation, free of charge. This means that no certification is awarded, but this is slowly changing.

Massive open online courses (MOOCs) are also increasingly used in blended learning, as some HE providers are starting to integrate MOOCs with physical exams and certificates, as outlined in Box 8. MOOCs were only introduced in 2011 but have since experienced strong growth, with around 4,000 MOOCs now being offered, as highlighted in Figure 9.³⁸ As part of a move towards blended learning, relatively modest fees are increasingly being charged to those wishing to undertake such courses.³⁹ For example, HEC Paris offers a MOOC in corporate finance for a fee of EUR 1,800. Upon successful completion of an exam, students obtain a certificate.⁴⁰

Figure 8: Cumulative number of MOOCs started/scheduled



Source: The Chronicle of Higher Education, October 19, 2015. MOOCs are still rising, at least in numbers

Multiple MOOC platforms have been launched in the last years with different business models. For instance, Coursera, a platform that had reached 15 million enrolled users at the end of 2015, and Sweden-based Coursio (see Box 9), are commercial companies, whereas edX was created as a non-profit foundation. In addition to the large MOOC players, mainly from the US market, the last years have seen the launch of new country/regional platforms, often funded by governments. Examples include France Universite Numerique in France, Open2Study in Australia, and the Malaysian MOOC platform.

38 The Chronicle of Higher Education, 19 October 2015. MOOCs are still rising, at least in numbers

39 Financial Times, 7 March 2016. Price is right for the next generation of digital courses

40 MOOC platform aggregating courses of 9 HE providers funded by the French government

Box 9: Crowd-sourcing education

Swedish Coursio, founded in 2010, aspires to change the way students learn. Leveraging passion and interest through what it calls “tribal learning”; it offers MOOCs held by passionate hobbyists, subject-matter experts and traditional universities.

Blended learning may not only include different media of learning. By opening up to leverage different content sources, the course can increasingly tailor learning to the students’ learning profiles. Such courses may have incorporated university-approved certifications, or may offer a plethora of diversified means to pass a traditional university exam.

Implications for providers of higher education

All universities should adopt blended-learning approaches, but do so selectively. The flipped-classroom model is widely applicable, offering two key benefits. First, it allows for a personalized, adaptive and student-centric learning experience. Students learn theoretical concepts online and at their own speed, pausing and repeating as often as desired. At the same time, HE providers can gather data in real time to assess the strengths and weaknesses of particular students or student groups. In this way, classes can be adapted to cover any concepts that students struggle with in more detail, resulting in better student outcomes.

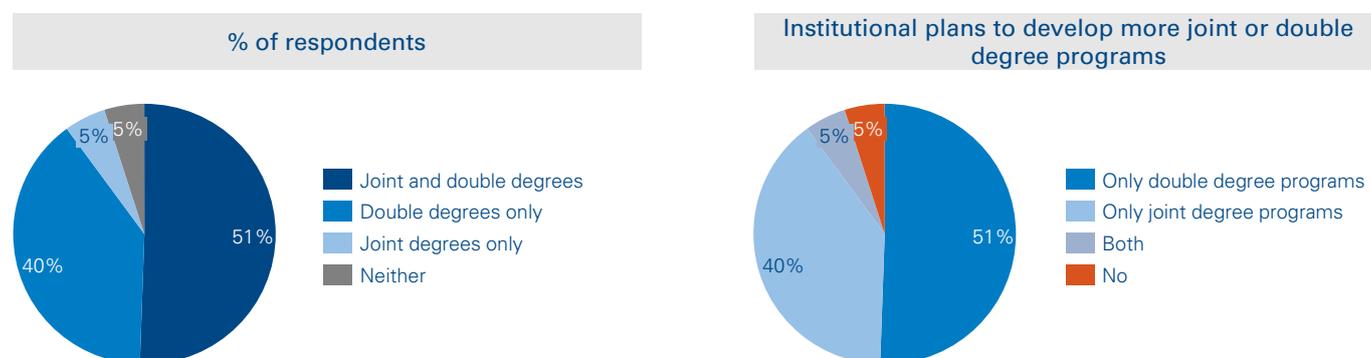
Second, the model directly benefits universities by reducing costs per student in the long run. For example, fewer senior lecturers are needed to run classes, and theoretical concepts only need to be recorded once, and can then be used across all students taking the course (with adjustments as required to keep the material up to date).

Box 10 gives the example of Nanyang Technological University, which is effectively implementing the flipped-classroom approach. Further, the University of Texas at Austin has produced publicly available guidance as to how education providers can implement the flipped-classroom concept most effectively.

Box 10: Best practice – Flipped classroom

Nanyang Technological University (NTU) in Singapore is taking a step-by-step approach to implementing the flipped classroom model. It initially started with a small number of disciplines, observed the results and evaluated lessons learned, before expanding this model across the entire university, department by department.

Figure 9: Plans to develop more joint and/or double degrees



Source: Institute of International Education, 2011. Joint and Double Degree Programs in the Global Context. Report on an International Survey. Arthur D. Little analysis

While it is recommended that the flipped-classroom model is adopted across HE institutions, it is not suitable or beneficial for all types and sizes of courses. In particular, due to initial investment costs and economies of scale, it is most beneficial for larger courses with over 50 students. These are often found during the first year of a bachelor's degree or the first semester of a master's degree.

HE providers should also consider MOOCs as a means of generating additional revenue and strengthening branding. They could reap additional revenues if they offered MOOCs at a fee, such as with the justification that students can obtain a certificate at the end. It is also a branding tool, as a large number of persons across the globe can be reached, in particular if (some of) the material is available online with unlimited access. HE providers need to establish which of those two benefits would be their main objectives and leverage this approach accordingly.

Of course, to leverage blended learning approaches effectively, using both flipped classroom and MOOCs, an adequate digital infrastructure needs to be set up, including online systems and tracking software. Collaboration with a reputable external provider is advisable, with a clearly structured plan for roll-out across the organization.

Collaborations between universities are growing, but increasingly selective (9)

The number of research and teaching collaborations will continue to grow. One-third of all academic research is now conducted jointly through international collaborations.⁴¹ As indicated by the British Council, "80 percent of countries' research impact is explained through their collaboration rate"⁴² – i.e. the higher the international research collaboration rate, the higher the impact of the research output.

Teaching collaborations are also growing, comprising exchange semesters, dual degrees and partnerships on branch campuses. A survey of 245 HE institutions across 28 countries⁴¹ found that 95% had plans to establish further double degrees or joint programs, as shown in Figure 9. The main motivations for setting up such additional teaching collaborations are to broaden the education offerings, enhance the international profile and visibility, and strengthen research collaborations.²⁹

While the number of international research and teaching collaborations is expected to grow, they will also become increasingly selective. In this regard, one of the world's top 20 universities, which rapidly moved up the global rankings, mentioned that it only seeks partners perceived to be as good as itself or better, as its partners reflect on its own image and branding.⁴²

Box 11: Best practice – Partnering in areas of strength

King Fahd University of Petroleum and Minerals (KFUPM) in Saudi Arabia, with a global ranking of 199th by QS, was able to partner with the Georgia Institute of Technology (Georgia Tech), ranked as 84th, over 100 places higher, by leveraging complementary strengths. They co-created a joint program in digital signal geo-processing in 2012. KFUPM already had a strong reputation in petroleum engineering, while Georgia Tech had a strong program in electrical engineering, and both were leveraged for the new joint program, offering a plethora of diversified means to pass a traditional university exam.

This argument of like-for-like partnering has also been mentioned by the OECD as one of its future of education scenarios.⁴³

41 Institute of International Education, 2011. Report on an International Survey: Joint and Double Degree Programs in the Global Context

42 Arthur D. Little interview 2015

43 OECD, 2008. Four Future Scenarios for Higher Education

Implications for providers of higher education

As one's own reputation is linked to the reputation of associated partners, universities should aim high when seeking to establish partnerships. One way to partner with those perceived as "better" is to seek partnerships in areas of complementary strength. For example, if a less prominent university has a particular strength and reputation in one area, it might appear an attractive partner to a university perceived as "better", but which is lacking strengths in that particular area.

Once an initial relationship is set up, it is easier to extend it to further areas. This principle also applies to exchange versus dual degree programs, with the latter involving greater commitment and joint organization. It is typically easier to establish exchange programs first, and universities should not seek to set up dual degrees without such prior exchange of experience. Further, universities should always set up partnerships "bottom up," led by faculty but with institutional support²⁹ where needed, as this relationship-based approach has proven to be the most effective.

Conclusions

The global Higher Education (HE) landscape is changing rapidly as a result of the nine megatrends outlined in this report. The playing field is shifting due to increasingly demanding students, financial pressures and growing competition. HE providers need to act now to succeed in the rapidly changing, approximately \$3 trillion¹ p.a. global HE market or risk being left behind.

To ensure a future-proof path, Arthur D. Little recommends that higher education providers:

- **Cater to the students of the future by prioritizing employability.** As students strive to adapt to a fast-changing work environment, employability will increasingly be a key university selection criterion. Universities should emphasize employability by shaping students into lifelong learners, applying problem-based learning, offering multidisciplinary degrees, and actively fostering entrepreneurialism.
- **Ride the wave of growing demand for corporate training and continuous education.** Players new to this market should enter through a targeted, step-wise approach, reaching out to the alumni network as a first target group. Initially, they should focus on areas of particular strength, ideally in a comparatively uncrowded education segment.
- **Optimize existing capacity and branch out internationally to meet the growing demand for higher education.** HE providers should fully utilize and optimize existing infrastructure, supported by blended learning approaches. They should also evaluate opportunities to establish offshore campuses in partnership with local players to cater to growing and geographically diverse demands.
- **Focus on key differentiators.** Less prominent universities need to understand their positioning and business models within national and regional education systems to identify positions where they show relative strength. To market this position, innovative branding should be deployed and focus set on areas of strength, diversifying selectively through partners.
- **Improve financial sustainability by strengthening ties with industry.** Universities should leverage industry contacts, often an underutilized revenue stream, to compensate for reduced public funding. Potentially attractive industry revenue streams include consultancy services, intellectual property licensing via a dedicated liaison office, and engaging in joint curriculum development for targeted courses. For this to be effective, those engaging with industry must have a strong business mindset, enhanced by well-structured management processes.
- **Maximize performance by allowing staff to focus more on their strengths.** University performance can often be optimized by allowing individual academic staff to spend more time on area(s) of strength – research or teaching. Overall objectives, resource constraints and performance evaluations need to be managed carefully, however.
- **Be an early adopter of digital trends that are shaping the education sector.** A task force should be set up to scan digital trends and provide recommendations on adoption. New infrastructure and systems should be set up through partnerships with external providers, rather than building them in-house, due to the complexity of such systems and the importance of sustainability and data security.

- **Adopt blended learning to personalize the student experience and maximize learning return on investment.** Particularly for courses with 50+ students, where economies of scale can be achieved, universities should introduce blended learning methods – especially flipped classroom – to provide a more student-centric and personalized learning experience while also saving costs. MOOCs should be leveraged to enable new revenue streams with relatively low costs.
- **Enhance global reputation by establishing collaborations with prominent players through areas of complementary strength.** Seek academic partners with better global reputations to enhance their own visibility. Such players can be attracted by focusing on areas of complementary strength. Partnerships should be established bottom up, which is most effective, but supported by formal systems.

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