

Middlesex University submission to House of Commons Education Select Committee Inquiry into the Fourth Industrial Revolution

Introduction

1. With 20,000 students based at our London campus in Hendon, Middlesex University is playing a pivotal role in preparing young people and adult learners for the Fourth Industrial Revolution. From our work-based learning focused on solving practical, real world problems, to embedding adaptability and creativity in all our programmes, Middlesex enables our learners to climb the ladder of opportunity, equipping them with the skills needed to adapt to the changing workplace of the future and progress. We also play a key role promoting social justice and fostering social cohesion by supporting a diverse, often disadvantaged student cohort through accessible learning and onto a skills escalator creating pathways to new careers and career progression. Our partnership with the Capital City College Group of further education (FE) colleges in London gives us even more scope to align skills supply with skills demand.

Key recommendations

- Education systems around the world are being challenged to adapt to a gathering wave of intelligent automation and technology convergence that is putting a premium on skills that can realise value from new tools. Universities have a crucial role to play in combining an advanced technical education with developing key skills to enable their graduates to adapt and innovate in this changing workplace. Modern knowledge jobs need both technical and academic learning – specific skills and general competencies developed in a wide range of subject contexts. Categorising the post-18 education system into academic or technical routes does not reflect the reality of the emerging jobs and skills landscape, where rather than these different routes it is levels of skill that need to be provided for by the education system.
- People are taking increasingly complex pathways between school, vocational training, higher education and employment. Although economic change is being driven by business models that combine scale with personalisation and organisational models that are agile and faster moving, it is also being driven by different personal choices about work-life balance and how to earn a living (such as moving between employee and freelancer, and vice versa). The education system should recognise that for many the learning journey is not linear and we need a system of education that supports complex pathways with opportunities to pause, accelerate and change focus depending on the learner's circumstances and needs. The increasing hybridisation of education across face-to-face and screen or on-line modes will increasingly enable this flexibility.
- It is vital that learners and workers avoid getting stuck at a particular level or part of the education system or labour market because routes through are not clear or supported. We need an education system that creates ladders of opportunity to develop learning at a pace that fits with an individual's particular life challenges and circumstances. Pedagogies that develop 'learnability' and the skills and behaviours that automation cannot easily replicate, such as creativity and critical thinking, are also key to enabling this. A common competency-based framework that helps learners to move between routes, as well as up and down levels, would be an important reform to enable automation readiness. Collaboration between FE and HE, such as

Middlesex University's strategic partnership with the Capital City College Group of FE colleges in London, can also help to create ladders of opportunity and progression pathways.

The role of lifelong learning in reskilling the work force

2. The Economist Intelligence Unit's 'automation readiness index'¹, which ranks 25 major countries, places the UK at number 8 in readiness for the coming wave of automation. However, the report notes that the top five countries are way ahead of the next five countries in the top 10, and even the best-performing countries need stronger policies to meet the challenges ahead. To enable our economies to adapt to the fourth industrial revolution the report concludes that education systems must be reformed to enable workers to continue to learn and upgrade their skills throughout their lives as technology changes.
3. Although a system of learning is needed which enables learners to move through different types of learning at different times and in different circumstances, the undergraduate degree as a level 6 qualification remains a cornerstone in respect of preparing young learners in particular for the future ahead. It is a qualification that is in demand from employers and learners, and should not be seen as a route through higher education that can be substituted with, for example, apprenticeships or level 3-5 qualifications. Apprenticeships, including degree apprenticeships, and level 3-5 qualifications complement the level 6 degree and need to make vital contributions to upskilling the workforce. Economic policy also needs to be more successful in creating rewarding and well-paid new jobs from technological change, including the jobs that graduates will increasingly create for themselves and for others. This includes more strongly encouraging and incentivising employers to invest in making the most of technical and graduate skills, as well as to understand skills adjacencies, i.e. how to bridge from existing skills (such as those of a new graduate) to what the employer needs (which will change at an increasingly rapid rate).
4. The current focus in education policy on completion of a qualification within a particular time period suggests that education is a linear process with a beginning and an end, and that learners all move through their programmes at the same pace. For many students this is not the case as they may need to seek employment and interrupt their studies, learn at different paces, or face ill health or caring responsibilities that slow down their progress. Provision needs to create the flexibility that enables changes in direction as well as linear progression. This approach places the learner's needs at the centre of the system, and demands more collaboration than currently exists between universities, colleges and employers, something which is only likely to change with common learning frameworks and learner-focused rather than sector-focused funding. With a premium on human capital in the fourth industrial revolution (since the full value of new technologies can only be realised by people skilled to realise this value) it is vital that learners avoid getting stuck and that the education system supports social cohesion by providing them with ladders of opportunity to develop their learning at a pace that fits with their lives. As technologies fuse and are used in ways that were not envisaged before, a new way of thinking is needed by tomorrow's workers that is able to cross traditional sector divides to drive value from technological innovation.

¹ <http://automationreadiness.eiu.com/whitepaper>

5. Currently the different funding systems across further education (FE), apprenticeships and higher education (HE) do not support this 'whole system' vision and make it difficult for learners to move between different types and levels of learning. This creates progression barriers because credit, standards and qualifications poorly articulate with each other, and is exacerbated by a tendency in policy to regard academic and technical routes as separate when there is considerable overlap. A system of credits, such as a common competency-based framework, that helps learners to move between routes, as well as levels, would help to address this. Collaboration between FE and HE can also help to create the ladders of opportunity or progression pathways needed. Middlesex's partnership with Capital City College Group of FE colleges supports growing collaborative provision of courses and apprenticeships both in London and in our overseas operations. If we can get our education provision right for the fourth industrial revolution we will also be able to export it successfully as there are growing needs for reform in education provision around the world. Our campuses in Dubai and Mauritius, for example, are seen by the governments of these countries as setting examples to other higher education institutions because of both their academic quality and the skills that our graduates have.
6. High quality careers information and guidance also has a key role to play in the system of lifelong learning that we are advocating. At Middlesex, our outreach work with schools and our pioneering work developing high quality careers information and guidance for young people are helping learners to understand the opportunities available to them. Our innovative *Make Your Mark* resources provide excellent guidance for young people on what is likely to be the best pathway for them, including apprenticeships, through a dynamic and interactive web micro-site. Universities, given the access they have to schools, have more potential to be the 'one stop shops' for careers information and guidance at every level.

Technical education and the fourth industrial revolution

7. Middlesex University is supportive of the Government's efforts to reform and better define technical routes. But there is a tendency to speak about technical and academic education as two separate systems with an implication of two separate pathways. This is at odds with the reality of skills needs and threatens a skills divide that mirrors social class advantages and disadvantages.
8. The UK HE sector plays a key role in delivering high level technical and professional education through advanced practice-led learning. Many universities are also deeply interconnected with FE institutions, like Middlesex through its partnership with CCCG and our group of Associate Colleges. Middlesex also sees apprenticeships as important additional pathways to higher level learning, providing opportunities for learners to upskill while in the workplace. We are a pioneer in delivering higher and degree apprenticeships with programmes including Chartered Management, Construction, Business to Business Sales, Teaching, Nursing, Police and Social Work.
9. T levels also have the potential to play an important role in enhancing technical skills. However, as with all the reforms to technical education, it will be important that there is effective bridging into and through higher education for those who want to progress if we are to avoid reinforcing an artificial divide between academic and technical routes. T levels should complement rather

than be an alternative to A levels, with both types of qualification expanding the range of provision at level 3 within a common learning framework that progresses to levels 7 and 8 (at level 8, the difference between PhDs and Professional Doctorates reflects what we are saying about the difference between T-levels and A-levels at level 3; the difference is the context in which many similar skills are developed).

The suitability of the current curriculum to prepare young people for the Fourth Industrial Revolution

10. Middlesex University works closely with employers, local government and national government to ensure that the skills we provide are aligned to the skills needs of the future. This is often around technical skills that will need continual updating (more often as small bites of learning rather than second or higher degrees) but is also about lifelong skills such as computational thinking and learnability to enable workers of the future to continue to adapt and respond to changes in the workplace. At Middlesex we have developed these as clearly articulated graduate attributes, skills that can be applied to a wide range of professional and learning environments such as critical thinking, problem-solving, organisation of workload, quantitative and qualitative analysis and presentation skills. For example, the University realised a few years ago that our Computer Science degree needed to adapt to ensure students were equipped with the skills required to embed software solutions into real-life scenarios such as new hardware. As a result we introduced physical computing into the curriculum, with students learning important skills and concepts by building systems. This includes learning how to design and build autonomous mobile systems (smart robots) and also how to automate systems such as the sensors, actuators and controllers found in a modern factory. Students have engaged with this to such an extent that we now offer training to all students in workshop skills, so that they can make their own components using 3D printing, laser cutters and traditional tools, and hence create prototypes easily and creatively. This is advanced, practical learning from the start; we engage first year students with it from their first weeks when for many universities these skills would only be developed in their third year because of what we would argue is an over-emphasis on content and passive learning in their early years of study.
11. The fourth industrial revolution is happening in a world that is increasingly aware of its diversity but at the same time is more mobile and connected than ever before. A unique feature of what we are doing at Middlesex is how we realise the 'diversity bonus' that we have among our diverse student body. International students are a very important part of this, bringing different perspectives and ways of thinking and working to problem solving and creativity. It is increasingly recognised that there is a diversity bonus from bringing together insights from different social, cultural and geographical contexts to solve complex problems and inspire creative ideas. For us, this is a development of our focus at Middlesex on learning from experience, and learning as an expansion of experience beyond just our own abilities and identities. Inspiration from diversity will be essential in producing the creativity that will put human abilities centre stage in the fourth industrial age.
12. The skills required by the fourth industrial revolution can best be serviced by business, FE and HE working together in a compact which encourages and incentivises universities to lead the development of the kind of innovative, integrated curriculum that will allow the UK to lead in the new economy. In particular, higher education needs to develop ways of thinking which reflect the fusing of technologies and sectors where technologies converge and can be used in

complex ways that were never envisaged a decade ago. Our Building Information Modelling Management programmes, for example, bring together areas of engineering, construction, management and smart environments in ways not imagined before. We need graduates who are equipped to tackle this technological convergence and drive value from technology as innovators, creators and lifelong learners.

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