CHAPTER 9

Transcending Boundaries: Educational Trajectories, Subject Domains, and Skills Demands

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Abstract This chapter reviews the links between new skills demands, higher education curriculum developments, and the growing interest in liberal arts and science education in various parts of the world. It assesses the value of a liberal arts and sciences model in respect of the changing skills demand from the labour market, the need to (re-)connect various knowledge domains that transcend the traditional disciplines and thus consider curriculum reform, and the link with trends and reforms in secondary education. Liberal arts and sciences programmes can be seen as a possibly powerful response to global demands and challenges which many countries are facing.

Keywords higher education curriculum • skills • learning outcomes • disciplines

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Introduction

The global development of liberal arts and sciences programmes in higher education raises important and fascinating questions with regard to the linkages of higher education curricula and pedagogy to the world of work and wider social benefits. Are liberal arts and sciences programmes providing a positive answer to the needs in the knowledge economy for creativity, critical thinking, and innovation skills? Do they offer alternative outlooks on the organisation of human knowledge, more suited to meet the demands of contemporary scientific research and technological development? Can they be seen as a move 'back to the future' of the very early roots of the university, in an economic and social context where many other boundaries are vanishing?

These questions go well beyond what can possibly be answered in this chapter. But they inspire the reflection on the links between new skills demands, higher education curriculum developments, and the growing interest in liberal arts and sciences education in various parts of the world. Despite their historical roots, liberal arts and sciences programmes still seem to be a field of experimentation and systemic experiential learning on how the higher education system can respond better to the social demands for innovation and excellence. Notwithstanding its diffuse and diverse expansion and its lack of homogeneity, the liberal arts and sciences education movement across the globe should be seen as a major force of innovation and reform in higher education. It is certainly not the only one and there are many equally interesting reform initiatives in higher education, but the liberal arts and sciences education is the one that forces us to think deeply about higher education's future.

What Do Students Learn?

One of the most intriguing questions about higher education is what exactly causes students to transform during the time they spend in colleges and universities in such a way that they take such a huge benefit from that experience in later life?

The evidence on the positive outcomes of higher education is overwhelming and very stable over time. The employment rate of 25- to 64-year-olds with a higher education degree is some 10 percentage points higher than for individuals with only an upper secondary education. The earnings premium for higher educated individuals compared to colleagues with only upper secondary education is estimated to be around 60%. Over a lifetime, the net present value of higher education is around US$160,000

for a man and US$100,000 for a woman on average across OECD countries. Higher education also results in important social benefits in health, social capital, interpersonal trust, or political participation. For example, 88% of higher educated individuals (self-)report good health against 79% of people with an upper secondary education (OECD 2014). These benefits are substantial and, as far as we know, have not been eroded by the economic crisis, quite on the contrary. They also seem to last over one's lifetime and do not diminish with age.

But we know very little about the processes that produce these outcomes. We do not understand well how the student's experience in university, the quality of the teaching and learning environment, the student's learning effort, and other variables interact in producing the added value in knowledge, skills, character, and metacognition that transform an individual into an educated person whom employers are willing to employ and to whom societies distribute many other scarce goods.

The traditional human capital theory centres on the substantive contribution of the teaching and learning process in higher education institutions to knowledge, skills, and other attributes of students. Unfortunately, we have very few data on the skills equivalent of higher education qualifications. The OECD Survey of Adult Skills (PIAAC) is the first attempt to measure skills among adult populations and its data allow the comparison of literacy and numeracy skills levels among higher education graduates (OECD 2013b). The data on skills of 20- to 34-year-old higher education graduates show two important points. First, the variation between countries is huge. The mean literacy score ranges from 291 (Italy) to 333 (Finland). The mean of the top-performing countries is higher than the 75th percentile of some of the low performers. Some of the countries with many universities featured in the top of the academic rankings demonstrate only very mediocre skills outcomes, while some countries more peripheral in the global academic system perform much better. Second, also within countries there is a lot of variation in the literacy score of young people with a university degree. A higher education degree does not seem to narrow the skills distribution very much.

Sure, literacy skills are foundational skills which are not primarily supposed to be acquired in higher education. Teaching and learning in universities have probably a higher value-added in more specialised skills sets. But these data are worrisome to the extent that they dismiss the idea that higher education qualifications signal a certain threshold skill level or guarantee employers a minimum skill set. In fact, the overlap in the distribution of literacy skills between university graduates and individuals

with only an upper secondary education as the highest level of education is very large. This means that the discriminatory function of a university degree is very much flawed. Hence, it is almost very problematic to regress the economic and social benefits of a higher education degree to its added value in terms of skills development.

The traditional human capital view is increasingly challenged by the 'signalling' or 'screening' hypothesis, which emphasises the selective functions of university programmes in providing employers with workers fit for specific job categories. Higher education thus acts as a mechanism saving employers the hassle of expensive recruitment, selection, and testing to identify the workers they need. In this hypothesis, the added value of a higher education plays a negligible role in the allocation of graduates to jobs, earnings, and other status goods.

For the screening or signalling hypothesis to work well, universities need to have some form of monopoly in awarding degrees which open doors to jobs. In most countries, this still seems to be the case. Recent OECD analysis (Paccagnella 2015) demonstrated that across countries participating in the OECD Survey of Adult skills (PIAAC) earnings are much more driven by formal education than by actual levels of skills. Not only the institutional regulation of labour markets but also the high symbolic power of university degrees ensure that qualifications, not skills, determine access to high-level jobs and earnings.

The contradiction between the high symbolic value of a higher education degree and their low value in terms of signalling a certain threshold level of skills might become one of the main systemic challenges for higher education. Recent research has provoked doubts on what students exactly learn in college and the added value in terms of knowledge and skills of students' higher education experience. In his controversial book *Our underachieving colleges* former Harvard president Derek Bok (2008) critiqued American colleges for not providing students with enough added value in developing writing, critical thinking, quantitative and moral reasoning skills. Arum and Roksa (2011) analysed data from the Collegiate Learning Assessment (CLA) instrument administered to a large sample of undergraduate students and concluded that a large share of them demonstrated no significant improvement in a range of academic skills during the first two years of college. In a subsequent report (Arum et al. s.d.), they confirmed and expanded their findings to conclude that 'large numbers of college students report that they experience only limited academic demands and invest only limited effort in their academic endeavours'.

Comparative international evidence on the learning outcomes of higher education graduates still is very fragmentary. OECD's Assessing Higher Education Learning Outcomes (AHELO) project so far has not moved beyond the feasibility study (OECD 2013a) and its large scale implementation meets strong resistance from parts of the higher education community. Still, in many countries the issue of higher education students' learning outcomes is high on the agenda and several interesting national and international research initiatives have been initiated to gather evidence and further insights into the matter (Van Damme 2015).

There are clear signals that employers are also becoming less and less satisfied with the kind of selection and training services higher education institutions are providing. They seem to be increasingly unhappy about the level and substance of graduates' skills and they start to rely more on their own human resources management capacity for selecting and testing candidates. In some cases they exhibit manifest distrust to universities' ability to test and select the best students. An interesting recent example was the announcement of Ernst & Young in the UK that it would no longer look at higher education qualifications in the selection of candidates (Havergal 2015).

Employers' organisations complain about the lack of twenty-first-century skills such as problem-solving, team work, or communication and the limited employability of graduates. Of course, this is not new, and probably also inevitable. Universities define their mission broader than employability. Fast changes in technology and innovation of work processes and management structures imply that skills of even recently graduated workers rapidly become obsolete. Employers and professional organisations tend to shift the blame for skills gaps to universities, to save themselves from expensive professional development and reskilling programmes.

But, having said this, the transformation of the global economy after the Great Recession seems to accelerate changes in skill demand, especially with the innovative firms at the top of the global value chains. Universities seem to be too slow in adjusting their educational programmes, and a widening skills gap, especially at the top of the distribution, is the consequence. For example, recent work at the UK's National Centre for Universities and Business suggests that global companies feel badly served by universities in providing them with top-level students with the right kind of skills for an innovative, global environment they will be working in (Stevenson 2014). Half of the companies surveyed indicated that they already introduced their own innovative strategies to find and develop talent.

Skills Demands of Innovative Economies and Societies

Employers' dissatisfaction raises the question about the kind of skills that higher education would need to foster to meet the demands of innovative economies and societies. Changing skills demand has to be understood against the transformation of employment and work as part of the global economic development. Technological change is an important driver of changing skills demand, with new technologies tending to be biased towards higher skills (Goldin and Katz 2008). Further research has shown a pattern of more polarised shifts in employment leading towards a U-shaped labour market, where also the low end of the skills distribution gets a higher share of labour market and occupations in the middle low employment shares. The so-called skill-biased technological change drives economies towards ever higher skills needs and, hence, might explain why higher numbers of higher education graduates are easily absorbed into labour markets and why benefits and returns—at least comparative to middle-educated workers—remain high.

Still, even if machines have not replaced human labour in the past, it is difficult to predict the future. Polarisation in the labour market might well not continue very far in the future (Autor 2015). With the frontiers of automation advancing at a rapid pace, the employment future of higher education graduates might become uncertain, certainly for those who are predominantly trained for routine cognitive tasks characterised by repetition and predictability, such as bookkeeping, data entry, and similar procedural tasks. Routine, codifiable tasks will be easily digitised and automated, even those tasks now performed by highly trained professionals. Instead, non-routine tasks mobilising workers' problem-solving, flexibility, communication, and creativity skills will become more important (Autor et al. 2003; Autor and Price 2013).

So, the issue is not so much the level of future skills demand, but the nature of skills which graduates will have to master to be employable and contribute to innovation, productivity, and growth. OECD's work on the skills needed for innovation has tried to elucidate that question. On the basis of an analysis of international data sources it was shown that the most innovative professionals had a varied mix of academic qualifications, including—not surprisingly—engineering and sciences, but also business, social science, and even arts degrees (Toner 2011; Avvisati et al. 2013). The traditional view that innovators mainly come from science and

engineering is partly confirmed, but the analysis also suggests that innovation benefits from a much larger set of specialisations and that the boundaries between academic fields of study are less important in the world of work than they seem to be in academia.

Furthermore, the analysis of Avvisati et al. (2013) also sheds light on the skills that were expected from innovative professionals in innovative jobs and on the skills that distinguished them from non-innovators. Highly innovative professionals have higher job requirements for any single skill than non-innovative workers, but their jobs also appealed much more to creativity, presentation, the 'alertness to opportunities', analytical thinking, the 'ability to coordinate activities', and the 'ability to acquire new knowledge' than was the case for non-innovative workers. This analysis provides rather rare empirical support for the importance of so-called '21st century skills' for innovative jobs and industries. Skills such as creativity and critical thinking, problem-solving, making connections, complex communication skills, teamwork, flexibility, and global competences are now generally seen as critically important for the workplaces and labour markets of tomorrow.

Added to those are skills that can be labelled as 'character' or social and emotional skills. The Center for Curriculum Redesign (CCR) has recently tried to develop a comprehensive 'character qualities framework', in which these social and emotional skills are identified and integrated (CCR 2015). It has come up with the following list: mindfulness, curiosity, courage, resilience, ethics, and leadership. Also these behavioural attributes play an important part in equipping young people for the jobs and social responsibilities in the world of tomorrow. They strongly overlap with the skills identified by global companies as necessary for future leaders to confront ever more complex challenges in an uncertain and volatile environment.

There are several attempts to integrate the various dimensions of skills demands and expectations of future graduates into one comprehensive framework, useful to guide curriculum reform. CCR quite convincingly argues for a four-dimensional framework of knowledge, skills, character, and metacognition: 'Knowledge must strike a better balance between traditional and modern subjects, as well as interdisciplinarity. Skills relate to the use of knowledge, and engage in a feedback loop with knowledge. Character qualities describe how one engages with, and behaves in, the world. Metacognition fosters the process of self-reflection and learning how to learn, as well as the building of the other three dimensions' (CCR 2015).

Subject Fields: Old Boundaries and New Interconnections

It is quite interesting to note that the mastery of a specific disciplinary field of study is not identified as one of the very top skills that differentiate innovative from non-innovative professionals (Avvisati et al. 2013). This seems to suggest that the specific field of study is not very important for the contribution a skilled worker can make to innovation. And, at a superficial look, this might also contradict the current policy concerns for the low numbers of Science, Technology, Engineering, and Mathematics (STEM) graduates that are seen as critically important for innovation, productivity, and growth.

On an average, across OECD countries, 15% of new higher education entrants choose 'engineering, manufacturing and construction', and another 20% 'science, life sciences, math and computing', against 20% for 'humanities and education', and 31% for 'social sciences, business and law' (OECD 2014). But in many countries, the numbers of STEM entrants are much lower than the average OECD figure. The number of STEM degrees has increased over the past years, but the rate of increase was lower than the increase in higher education degrees in general, so the relative share of STEM graduates in the population with a higher education has gradually declined.

Another interesting observation made in recent OECD research is that the 'field-of-study' mismatch between graduation and employment is actually rather high, also for STEM graduates (Montt 2015). Across countries that participated in the OECD Survey of Adult Skills no less than 65% of workers trained in 'science, life sciences, math and computing' are actually working in another field than the one they have been trained for, much higher than the average mismatch across fields of study of 39%. The figure is not much lower than the one for 'humanities and education' of 73%, but much higher than the one for 'social sciences, business and law' of 23%. For 'engineering, manufacturing and construction' it is 33%. These data nuance the widespread concern about low numbers of STEM graduates as being not only a problem of the choice of study at the entry of higher education, but also of the suitable employment opportunities afterwards. But they also indicate the importance of the post-gradation professional mobility on the labour market.

A recent report on the STEM workforce of the US National Science Foundation (NSF 2015) has further qualified the debate. It requests

policymakers to move away from a narrow focus on STEM qualifications and to better understand the heterogeneity of the STEM workforce. It also demonstrates that STEM workers do not follow one linear trajectory, but that there are multiple pathways leading to STEM jobs. At least in the USA—but if we look at Montt's data, the same is probably true for other countries—there are rather loose links between field of study and actual STEM occupations. STEM workers can be trained in disciplines which are not directly identified as STEM. The report argues for a more holistic approach to STEM education, an approach by which across many disciplines, a STEM-'capable' workforce is trained. Ultimately, all future workers need to have access to high-quality higher education that enables them for STEM capability. Liberal arts and sciences programmes have understood this very well.

This is very much in line with Avvisati et al. (2013) when they say that many of the critically important skills for innovation can be fostered in all fields of study, even if it could take a different shape from one subject to another. STEM graduates might be in high demand, not because of their specific, technical skills, but because of their strengths in innovation skills. Employers reward the critical thinking, problem-solving, behavioural and social skills perceived to be part of STEM education, rather than the technical STEM skills.

Whether similar arguments can be made for other fields of study is less clear. For example, for the arts—a field of study of which a significant number of graduates end up in innovative jobs five years after graduation, especially in product innovation (Avvisati et al. 2013)—a review of experimental research in arts education in schools demonstrated no real significant effect on various other cognitive and non-cognitive skills, other than through selection effects (OECD 2013c). The specific contribution of various disciplines and fields of study to the development of innovation skills or 'twenty-first-century skills' is still largely unchartered territory.

Anyway, the discussion so far seems to provide support for smart new combinations of disciplines in higher education curricula. Interdisciplinarity might have become a fashionable and often superficial mode of curriculum reform (Jacobs 2014), but interdisciplinarity also is a core component of many interesting examples of curriculum and pedagogical reforms in higher education, such as problem-based learning (Hoidn and Kärkkäinen 2014). Disciplines go back to the eighteenth- and nineteenth-century organisation of human knowledge and have institutionalised themselves in various ways. But today the most fascinating discoveries and frontier

developments in scientific research are to be found at the boundaries or in the intersections of disciplines. Interdisciplinarity should not be understood as simply mixing multiple disciplines, but as a smart way to spell out the interconnectivity between various complementary viewpoints and a necessary condition to solve today's complex problems.

Liberal Arts and Sciences Education as Curriculum Reform

The obvious question after the discussion so far then is how these developments impact the curriculum and its reform in higher education. The field of curriculum studies is predominantly concentrated on school education and is not yet well developed in higher education (Vidovich et al. 2012). And when curriculum reform in higher education is studied, most of the attention goes to the formal processes and characteristics of reform initiatives, and rarely to the substance and direction of reform.

At the same time, a lot is going on in higher education and many institutions are reshaping and redesigning their teaching and learning environments to optimise the student learning experience (Kärkkäinen 2012; Pegg 2013). After a period in which the global higher education community was focusing on improving research performance and getting integrated in the global research system, universities are now turning their institutional energy and resources to improving teaching and learning. Governmental initiatives have been taken to support the improvement and innovation of teaching and learning, while also regional and global reform processes, such as the Bologna Process and its companion Tuning Project, are inducing change and reform in the design of higher education programmes. This includes for example, reviewing the programme's learning objectives, rethinking pedagogies, choosing the right learning resources, or changing student assessment. Technology also is a great driver of reform in curricula and pedagogy (Sharples et al. 2014).

Curricula and their translation into content and pedagogical design can be seen as a particular and time/space specific organisation of knowledge, skills, character, and metacognition with the following characteristics: (1) a curriculum balances and integrates external demand (demand side) and internal purpose and mission (supply side); (2) it has to be economic in terms of resources and effective use of students' learning time, so it includes

a normative framework that helps to distinguish and select the important from the trivial; (3) it integrates a psychological framework of learning, ideally based on the current state of learning sciences; and (4) it includes a theory of action, which describes how content and pedagogy help to realise the intended learning outcomes of students that meet the external demands and internal purposes. Obviously, in most cases a lot of all this remains implicit; institutions are very rarely open and transparent about what drives them in curriculum reform. But, essentially, all curriculum reform efforts are intentional in the way they try to shape the students' teaching and learning experience and the learning objectives that should result from it.

Curricula are set in a specific time and space configuration, but at the same time also transcend time and space. Contemporary higher education curricula still are strongly located in local and national spaces, but probably have stronger global ambitions than in the past. And they carry with them a heavy historical legacy, but increasingly aim for the future in their ambitions to prepare students for a lifelong career and a fulfilling personal life, and in their ambitions to serve humanity's future and mankind's resilience against many challenges.

Curriculum reform to a large extent is a process of selection. First of all, a selection has to be made of the most relevant external demands with which a programme is confronted. In answering the question 'what should students learn' a myriad of external demands rival for attention and importance. Second, a selection has to be made in the purposes of the programme and the learning objectives derived from them. Third, a selection then is necessary of the best-suited content and pedagogical approaches to realise these learning objectives. The need to be selective implies that often curricula reform approaches are value-loaded, because the arguments with which these choices are justified are normative in kind.

These few short conceptual notes are necessary to understand that any curriculum reform approach is a specific attempt to answer these questions and meet these requirements. For example, the 'Problem Based Learning' approach is a particular way to organise the curriculum, content, and pedagogy, drawing on insights on student-centred learning, and on reflections on what really matters for students' learning outcomes and professional competence (Kärkkäinen 2012). In much the same way, we can see the liberal arts and sciences education as a specific response to the curriculum reform pressures in higher education. The implementation in specific con-

texts and institutions might differ, but there are strong unifying elements that can be described along the following lines:

Well-Roundedness A characteristic feature of liberal arts and sciences education is its case for well-roundedness. This concept refers to very old academic traditions, but has also references to very different cultural contexts. It basically denotes the importance of mastery of very different areas of knowledge and understanding, but also of the harmonious balance between knowledge and other forms of human understanding including the arts and ethics. The concept reminds of Howard Gardner's (2011) views on truth, beauty, and goodness as virtues in education. The harmonious development of the person living in the twenty-first century is an important objective of liberal arts and sciences programmes.

Connecting Tradition, Modernity, and Innovation Liberal arts and sciences education has strong roots in the very old traditions of the European university, although more utilitarian approaches and the Humboldtian model of the research university contributed to its sharp decline in Europe (Van der Wende 2011). Interestingly, the model now also appeals to very old traditions in various Asian educational contexts, as several chapters in this book explain. At the same time the continued existence (in the USA), its resurgence (in Europe), and its growing popularity (in Asia) show how well the model integrates with modernity and the modernisation imperative in developed and emerging countries alike. Yet, its pedagogical objectives and ambitions also align very well with the arguments in favour of twenty-first-century skills, as can be seen in attempts to focus on critical thinking, creativity, and problem-solving.

Intercultural Especially new developments in liberal arts and sciences education in Europe (Van der Wende 2011) have a very clear focus on interculturality and a global approach, both in their international student intake, the use of English as the language of instruction, and the global embedding of curricula content. Global competences such as a profound understanding and respect for cultural diversity and interdependence are an integral part of these programmes' learning objectives.

Interdisciplinarity A common, defining feature of liberal arts and sciences programmes is their integration of various disciplines into a coherent curriculum, often combining natural and life sciences, social sciences, and

humanities and the arts into interesting and innovative combinations, with large numbers of elective courses open to students to construct their own curriculum. At least in Europe, but probably also elsewhere, the (re-) emergence of liberal arts and sciences education coincides with a more general tendency to avoid early specialisation and to build a more comprehensive and integrated curriculum at the undergraduate level.

Diversification for Excellence Several newly established liberal arts and sciences programmes take a more selective approach than usual in their systems, as is the case for example in the Netherlands. It is a clear ambition to be a component of diversification in the system, whereby specific and intellectually challenging trajectories are offered to very talented students. Opening routes to excellence is seen as a corrective against the confusion prevalent in many systems that massification equals mediocrity. Trajectories towards excellence also function as pathways for future leaders, trained in a global environment and educated through highly demanding tasks.

Matching Educational Trajectories Liberal arts and sciences education not only has the ambition to form well-rounded persons with a breadth of experience and knowledge, but also aims to be a key component of a harmonious educational trajectory over the course of life. Liberal arts and sciences programmes are thinking very critically—much more than usually in higher education—about how they can position themselves between secondary school education, postgraduate studies, entry into professional careers, and lifelong learning. They might well be at odds with some tendencies that can be observed in school education, such as the decline in arts education or increasing specialisation, but they are also in line with attempts to modernise the school curriculum, for example in innovative schools and learning environments (OECD 2013d) or initiatives like the International Baccalaureate. Through their curricula they also ensure that students have broad options for postgraduate study. Several liberal arts and sciences programmes include provisions for educational career guidance and invite students to think critically about their educational choices and life trajectory. In contrast to Zakaria (2015) in his powerful defence of liberal education, I would not oppose liberal arts and sciences education against more utilitarian and vocational purposes and objectives in higher education. The interesting thing is that it aims at combining and integrating vocational and general academic objectives.

Conclusion

The growing interest for liberal arts and sciences education across countries and cultures today, demonstrated by this book, suggests that it should not so much be seen as the product of specific historical and cultural circumstances and forces, but as a possibly powerful response to global demands and challenges which many countries are facing. The specific form liberal arts and sciences programmes take in particular settings might well be moulded by the local and national history and culture, but the common thread across the globe is probably that such programmes hold the promise to provide better answers to needs and demands of the twenty-first century than some of the competing curriculum reform models.

One of the reasons for this is that liberal arts and sciences education in many ways aims at 'transcending boundaries', an ambition that is very appealing in the modern world. Future leaders will have to be able to overcome the many divisions, boundaries, and segmentations of today's world in order to solve its problems. Bridging disciplines, spheres of life, old and new skills demands, cultural and political cleavages, and so on is very much at the heart of liberal arts and sciences education. If we want to understand why liberal arts and sciences education seems to appeal to many people, higher education institutions, and students in very different parts of the world, this may be one of the answers.

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