Chapter 2
Development of Liberal Arts Education and Colleges: Historical and Global Perspectives

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A historical study of the liberal arts should be carried out "liberally." If applied too mechanically, a rigid definition of "the seven liberal arts" will produce only a record of routinized ideas and practices and offer little real insights and even end up in chaos. This chapter therefore takes a middle road by borrowing from Jose Ortega y Gasset's definition of culture as "the *vital* system of ideas of a period." Ortega saw life as "a tangled and confused jungle in which man … labors to find 'roads,' 'ways' through the woods, in the form of clear, firm ideas concerning the universe, positive convictions about the nature of things (Ortega 1992,[1] pp. 27–8)." The liberal arts have provided these "ways through the woods." The following chapter examines the development of Western liberal education with some reference to the Middle Ages and the Scientific Revolution, but mainly to modern America.

The Birth and Evolution of Liberal Arts Education in Europe

The Middle Ages: Logic at the Center of Liberal Education

Although a system of seven liberal arts, namely the *trivium* (grammar, rhetoric, logic) and *quadrivium* (arithmetic, astronomy, geometry, and music), originated in antiquity, its institutional establishment started in the Middle Ages (Kimball 1995). During the 12th century, holds Charles Homer Haskins, the system was vastly enriched by an influx of new knowledge such as the major works of Aristotle,

[1]Originally published in 1930.

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Galen, and Hippocrates, transmitted in Arabic sources via Spain and Italy. Together, the old and new knowledge gave birth to the learned professions and, hence, to the university itself (Haskins 1957, pp. 4–5).

However, in the early universities, logic overwhelmed all the other arts. Logical disputation often focused on the theory of "substance," which Peter Abelard had located anew in Aristotle's "old" logic (Wagner 1986, p. 128). Aristotle, diverging from Plato's concept of 'Ideas', had clearly pronounced that individual beings were primary and general categories secondary (*Categories*—Chap. 5). Wherever his ultimate intention lay, Abelard's position "was always looked upon as a form of nominalism" (Rashdall 1997,[2] p. 64). He was immensely popular because his Aristotelian logic definitely helped give shape to young people's incipient expectations for new worldviews in the Middle Ages. European feudalism, in the process of being completed, had the effect of stabilizing agricultural production through the peace of lands with kings and warrior classes occupying the top of social hierarchy. Stabilized production in turn permanently supported autonomous city inhabitants who, unlike farmers, protected their "walled" territories fully by themselves (Mumford 1989, p. 357). Hence, *Stadtluft macht frei* ("urban air makes people free"). They even challenged, to the great excitement of contemporary youngsters, the ideologies of fixed hierarchy which the feudal rulers shared with the Roman Church. Abelard's use of Aristotle to question Church dogma naturally caused a pervasive sensation. Thus, in the next century, St. Thomas Aquinas had to bring the unlikely but indispensable application of atheistic Aristotle to Christianity to its apex, and his neo-Aristotelian (rationalist) theology came to structure the universities' approach to the liberal arts for the next three centuries (Pegis 1948, p. xxviii).

The Renaissance and Reformation: The Rise of the Humanities

The 13th–16th centuries saw the birth of the modern "humanities," wherein each human being sought "a center and a resting place", not in the eternal heavens but "*within* himself" (Proctor 1998, pp. xxvi–xxvii). During the Renaissance, ancient languages other than Latin, Greek in particular, began to occupy a key place in liberal education and there was a greater focus on rhetoric and eloquence, the relationship between literary/aesthetic and moral education and the new educational ideals of "the gentleman's calling" and social grace. In these ways, the humanities even prevented the universities from contributing to the rise of science (Ridder-Symoens 1996, p. 38).

[2]Originally published in 1936.

Table 2.1 Timeline of the scientific revolution and the reformation

Major events/works of the Scientific Revolution	Major event of the Reformation
• Tartaglia. *A New Science* (1537) • Copernicus. *The Revolutions of the Celestial Spheres* (1543) • Vesalius. *The Seven Books on the Structure of the Human Body* (1543)	• Luther's Ninety-five Theses (1517) • Peasant War (1524–25) • The (Huguenot) Wars of Religion (1562–98) • Alba's Suppression of Protestants in the Netherlands (1567)
• The Trial of Galileo (1616) • Bacon. *The New Atlantis* (1614–17) • Galileo. *The Two Principal World- Systems* (1632) • Descartes withheld *Le Monde* (1633) • Mersenne's conferences (1635–48) • Descartes. *Discourse on Method* (1637) • Galileo. *Two New Sciences* (1638) • Descartes. *Principles of Philosophy* (1644)	• Thirty Years' War (1618–48) • Sweden's Entry (1630) • France's Entry (1635) • [Harvard Univ. founded (1636)] • Puritan Revolution (1642–49)

The Scientific Revolution: From Logic to Mathematics

The Reformation marked a new approach to liberal education as well as a crisis for Christendom. Alfred N. Whitehead contrasted the peaceful emergence of science with the bloody religious wars of that period (Whitehead 1967).[3] But why did this revolution not occur earlier? Consider the timelines of the major events of the Scientific Revolution and the Reformation (Table 2.1). And consider the case of the works of Galileo and Descartes and The Thirty Years' War (1618–1648). In contrast to the knowledge obtained from the major books of the time, Galileo, in *The Assayer* published in 1632, posited Philosophy which is "written in this grand book, the universe, which…cannot be understood unless one first learns to comprehend the language of mathematics (in Drake 1957, pp. 237–238)." Deploring linguistic ambiguity and the resulting misunderstandings giving rise to the religious bloodshed of his day, Galileo argued that his mathematical approach to knowledge offered a superior language for understanding God's creation. The new universal science which would transcend the largest religious conflict ever as the way to unity and truth entailed the decisive shift from Aristotelian logic to mathematical natural philosophy as the viable, central subject of liberal arts in the 17th century.

[3]Originally published in 1925.

The Development of Liberal Education in the US

Early US Colonial Colleges

Modern science did not emerge triumphant everywhere, nor did religion and mathematical science always go hand in hand. When Harvard was established in the midst of the Thirty Years War, its first president, Henry Dunster (1640–1654), put his main curricular emphasis on Hebrew (Hornberger 1968, p. 23) (Table 2.2). The biblical language was then regarded as the only perfect language which could correctly reproduce natural knowledge which had been lost since Adam's fall at Eden (Harrison 2007, pp. 192–194). On the other hand, until Isaac Newton's arrival, Cantabrigians in England still regarded arithmetic and geometry "as beneath the dignity of scholars (Hornberger 1968, p. 25)."

Under Dunster, rather than science, early Harvard students read the Scriptures "out of Hebrew into Greek from the Old Testament in the morning, and out of English into Greek from the New Testament in the evening (Chaplin 1872, pp. 64–65).'" Dunster's successor Charles Chauncy, and Yale President Timothy Cutler (1719–1726) were also competent Hebrew scholars (Kelley 1974, p. 33; Morison 1936, pp. 200–201). As late as the 1750s, when Newton's theories were suspected of spreading deism, King's College president Samuel Johnson (1753–1763) replaced science courses with John Hutchinson's orthodox *Moses' Principia*, which appealed "to our senses for the *perfection* of the Hebrew language … (as) the primary source of real knowledge (Hutchinson 1755, p. 5)."

As the next century unfolded, mathematical science surpassed Hebrew in the college curriculum, as seen at the University of Pennsylvania (Table 2.3).

Table 2.2 The Harvard college curriculum in 1640

Subject	Hour	Subject	Hour
Logic and disputations (in Latin)	30	Ethics and politics	8
Greek	24	Arithmetic and geometry	6
Hebrew, Aramaic, Syriac	24	Physics, astronomy	2.2
Rhetoric and declamations	24	The nature of plants	2
Divinity and commonplaces	16	History	2

Source Adapted from Hornberger (1968, p. 23)
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Table 2.3 The University of Pennsylvania curriculum in the 18th century

Subject	Hour	Subject	Hour
Latin and greek	29	Logic, declamations, etc.	4.4
Mathematics	22	Review, chemistry and agriculture	4.4
Ethics and politics	10	Astronomy and natural history	3
Natural philosophy	7	History	3

Source Hornberger (1968, p. 29)
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After the arrival of Newton's scientific works in 1714, even the conservative Yale accommodated courses in algebra and mathematical astronomy (Rudolph 1977, p. 33) and after American Independence, science became a staple subject. In 1860, the typical American college could claim four science professors, and in 1900, Williams College gave as many as 15 out of 31 faculty places to scientists (Guralnick 1975, p. ix).

The 19th Century: The Rise of Science and Challenges to Liberal Arts Colleges

In 1862, the US Congress passed the Morrill (Land-Grant) Act, which sought "to promote the *liberal* and practical education of the industrial classes." (Section 4. italics added.) This reference to liberal education can be traced back to the forerunner of Justin Morrill, Jonathan B. Turner of Illinois, who held that existing collegiate education had been monopolized by the old professions and that the new industrial classes needed scientific training that connect abstract theory with useful arts and provided a "liberal" education for "practical" ends (Carriel 1961, p. 69; p. 72).

William Barton Rogers, the future founder and the first president of MIT (1862–1870), was bold enough to pronounce the superiority of science from a *moral* point of view (1855, pp. 28–29). In 1855, disparaging the passing fashion "to decry the growth of positive science as unfriendly to poetical and spiritual conceptions," he argued that it was only through humanity's understanding of the natural forces, "their harmonious arrangements and their adaptations to wise and beneficent ends, that material phenomena become imbued with a spiritual and poetical significance." A few decades later, William P. Atkinson, another MIT professor, singled out physical science as essential to liberal education, saying that as long as men's understanding of the physical nature remained restricted, "war and savage occupations" would consume "the days of the mass of men" and that physical science would emancipate humanity into a new phase of intellectual life, transforming human society from "a battle-ground … into a school-room" (Atkinson 1873, pp. 25–26). By the turn of the century, humanities student John Erskine at Columbia University was witnessing that "One by one, the teachers of science began to plead for their subjects, at first asserting that the study of science had a fifty-fifty chance of yielding as much culture as the study of the classics. Before long, they were arguing that the study of science would yield the only kind of culture worth having in a modern world (Erskine 1947, p. 228)."

The rise of the research universities accompanied the elevating status of science. In 1900, the nation's fourteen major universities formed the Association of American Universities (AAU) as a measure to put the American universities' scientific scholarship on a par with their esteemed German counterparts (Hawkins 1992, pp. 10ff). Differences in size between these research institutions and the

liberal arts colleges widened. The average number of faculty and students in the seven largest AAU universities increased from 44 and 524 in 1880 to 652 and 6,208 in 1919. The respective numbers in 67 typical liberal arts colleges increased only from 10 and 105 in 1880 to 35 and 513 in 1919 (American Council on Education 1961; US Office of Education 1882, 1923).[4] Indeed, by 1905 Chicago president William Rainey Harper said he saw no *raison d' etre* for these colleges (Harper 1905, p. 379).

The Great War: the Revival of the Humanities

However, the liberal arts colleges continued to thrive. In 1908 Harvard literature professor Irving Babbitt represented humanists in a revolt against the rise of research universities. He held that the premise of unlimited scientific progress and unconditional faith in the goodness of humanity was the cause of contemporary social troubles the havoc being wreaked upon the world. Critics described the new business magnates as "robber barons and "vampires in human form." Along with other key contemporary industrialists such as Andrew Carnegie, Rockefeller defined the structure of modern philanthropy by donating huge sums to the University of Chicago for the welfare of humankind. But Babbitt doubted whether such philanthropy based on rapacious capitalism was sustainable. In its stead, he proposed a new humanism requiring moral edification nurturing character, self-reflection and a sense of humility that could best be taught in liberal arts colleges, where students could assimilate the accumulated wisdom of the ages (Babbitt 1986, pp. 106–107).

By 1914 Arnold J. Toynbee's experience at Oxford confirmed Babbitt's position. Teaching Thucydides, Toynbee (1953, pp. 7–8) saw in the Greek historian an anticipation of the 20th century struggles, one that obliterated "the chronological notation which registered my world as 'modern' and Thucydides' world as 'ancient.'" Toynbee later identified the key index of modernity as the application of scientific thought to the physical environment. Indeed, after the end of WWI, serious skepticism arose over the benefits of scientific study and prophecy of its moral benefits. John Dewey, a most insightful philosopher of modern science, reflected:

> We were told that the advance of science had made war practically impossible. We now know that science has not only rendered the engine of war more deadly, but has also increased the powers of resistance and endurance when war comes…Has man subjugated physical nature only to release forces beyond his control? (Dewey 1980, p. 236)

[4]Of 166 selective liberal arts colleges in the 1995 *Almanac of Higher Ed.* those for which the relevant data were available were sifted out.

Table 2.4 Comparison of students' majors before and after the great war

Major	Students studied between 1910–14	Senior students in 1923
Science and math	84 (15.5 %)	33 (8.9 %)
Social science	171 (31.5 %)	120 (32.5 %)
Humanities	231 (42.5 %)	178 (48.2 %)
Others	57 (10.5 %)	38 (10.3 %)
Total	543 (100.0 %)	369 (99.9 %)

Source Kelly (1925, p. 181ff)
Data in the public domain

Table 2.5 The number of US higher education institutions by type

Year	University	College	Technical school
1951	129	688	51

Source US Office of Education (1955, p. 3)
Data in the public domain

In 1915, 15 years after the formation of the AAU and partly due to critical reflection that the whole of civilization had fallen "victim to science", the leaders of some 150 liberal arts colleges established the Association of American Colleges. Its early president Henry Churchill King held that modern society required a "deep-going self-discipline and large-visioned ideals—precisely the training that no other institution can so adequately give as the college (King 1917, p. 14)."

Indeed, the Great War had the effect of attracting more students to history, philosophy, literature, and the fine arts. A 1925 survey of two groups of students who studied before and after the Great War at 12 institutions including Stanford, Minnesota, Grinnell and Oberlin revealed a decrease in science majors and an increase in humanities majors (Table 2.4).

Just as the humanities increased during the first half of the 20th century, so did the number of liberal arts colleges compared with large universities and technical schools (Table 2.5). It was said that while universities promoted the study "of the physical sciences," liberal arts colleges had provided "a home … where youth can bask … in the sunshine of idealism (Few 1930, pp. 105–106)."

At Swarthmore College, a private liberal arts college in Pennsylvania founded in 1864, the President Frank Aydelotte (1921–1939), a former Rhodes Scholar who had studied at Oxford University, introduced the British idea of junior and senior honors students studying in chosen fields on the basis of a list of references, largely autonomously but with advice from tutors, and external examiners assessing them through to Highest Honors. Aydelotte saw this as an effective alternative to the German model of advanced training. Despite chronic opposition from the dominant egalitarians, this paved the way for solid scholarship at such colleges as Read, Carleton and Swarthmore itself (Clark 1992; Swarthmore College Faculty 1942; Tachikawa 1991).

Liberal Education Initiatives at Columbia, Wisconsin and Chicago

Upon the US declaration of war with Germany in 1917, as part of a new Students' Army Training Corps program, the War Department asked Columbia to develop a "War Issues" course, later implemented at some 500 schools. Even before the armistice, a few Columbia professors refashioned it into a required freshman course, "Contemporary Civilization," that sought to give the students a sense of their place in western history. In an era of rising disciplinary specialization, this course signaled a strong commitment to interdisciplinarity, studying the past in order to understand the present and providing students with a sense of moral purpose as members of a civilized society (Buchler 1954, p. 56; Summerscales 1970, p. 125). This marked a new departure in liberal education.

By the late 1920s, Wisconsin and Chicago, two of the nation's biggest PhD producers, had the largest number of undergraduates (US Office of Education 1930, Chapter XII). Rethinking its approach to collegiate education, Wisconsin brought in Alexander Meiklejohn, a former Amherst College president, who feared the "destructiveness of modern technology and [the] moral emptiness of modern science" and believed that science bore responsibility for the lack of intellectual unity in the undergraduate curriculum (Meiklejohn 1920, p. 43; Nelson 2001, p. 159). He introduced curriculum reform with a focus on "understanding human life as to be ready and equipped for the practice of it", and subsequently made the humanities coursework more interdisciplinary, added social sciences courses, and attracted new faculty members interested in the Socratic method. He also created a new two-year program, the Experimental College in which students and advisers lived together in the same dormitory, studying ancient Athens in the first year and contemporary America in the second. Using selected texts from both civilizations and especially Plato and Henry Adams, the students scrutinized their society's problems—from war to economic inequality—and examined the "contemporaneity" of the ancient and modern worlds, thus restoring unity to a curriculum once broken by science. The College attracted national attention, but closed its doors in the Depression (Cronon and Jenkins 1994, pp. 200ff; Nelson 2001, p. 63).

Chicago had devoted its energy and resources to doctoral programs with the result that it cared less for its growing number of undergraduates (Boucher 1935, p. 1). Noting the consequences of this, president Robert M. Hutchins sought to improve their education through the so-called "Great Books of the Western World" which he felt were replete with unifying wisdom, something glaringly missing from modern thought (Hutchins 1968a,[5] p. 105). Hutchins felt that these books were accessible to all, including the most specialized scientists and that no faculty members should ever ignore general education, lest undergraduates ended up prepared only for narrow expertise in a complex (and violent) world. He felt that if the

[5]Originally published in 1936.

staff failed to share with students "a common intellectual training, a university must remain a series of disparate schools and departments (Hutchins 1968a, p. 59)." He largely addressed this proposal to his fellow professors—who sadly rejected the idea (MacAloon 1992, pp. 111–112).

John Dewey closely reviewed both of these programs. Although he saw value in Meiklejohn's efforts to integrate studies, he doubted that exposure to Plato could really help students understand contemporary problems (Dewey 1932, pp. 23–24). Similarly, he viewed Hutchins's admiration for Plato, Aristotle and St. Thomas as an evasion of modern science, an astounding expectation of them "to do for present situation what they did for the Greek and Medieval eras (Dewey 1937, p. 164)." Insofar as Dewey's critique hinged upon a "progressive" view of science, this became increasingly questionable in the cataclysms of the mid-twentieth century. Indeed, by the 1960s, the main task for liberal education became the revival of the humanistic tradition almost in counteraction to the dominance of science and technology. Both Hutchins and Dewey, representing competing idealist and instrumentalist theories of knowledge, may be seen as sharing the view that "humanizing science" was a central task of philosophical education (Dewey 1958,[6] p. 164; Hutchins 1968b,[7] p. 195).

Conclusion: Accomplishments and Future Tasks of Liberal Arts Colleges

A 1950 survey of institutions where PhD scientists who appeared on a list of "American Men of Science" had studied for their undergraduate degrees between 1924 and 1934 revealed the surprising finding that 39 liberal arts colleges made the top 50 while only three AAU universities were represented. Even the top 15 included as many as 13 liberal arts colleges (Table 2.6). A 2002–2011 survey still testifies to a similar pattern. While Caltech, Harvey Mudd and MIT lead the list, liberal arts colleges such as Reed, Swarthmore, Carleton follow closely and occupy 25 slots among the top 50 (Fiegener and Proudfoot 2013, p. 5). Cech (2000, p. 209) attributes their success to the student focus at these colleges, where undergraduates are "the reason for the existence of the institution," engendering among students "confidence and a feeling of self-worth."

It is worth noting that in the 1950 survey 31 of the top colleges were located in the Midwest or on the Pacific Coast (Goodrich and knapp 1951, pp. 163–164). By 1910 the historian Frederick Jackson Turner was encouraging Midwestern students to continue the frontier traditions by conquering the scientific frontier (Turner 1962,[8] pp. 283–284). That same year, journalist Edwin Slosson found that Harvard

[6]Originally published in 1929.

[7]Originally published in 1936.

[8]Originally published in 1920.

Table 2.6 Top 15 institutions with large percentage of scientist-graduates

Ranking	Name	#	Ranking	Name	#	Ranking	Name	#
[a]1	Reed	131.8	6	Mass. State	55.6	[a]11	Antioch	45.1
2	Caltech	66.3	[a]7	Hope	51.1	[a]12	Marietta	45.1
[a]3	Kalamazoo	66.3	[a]8	DePauw	47.6	[a]13	Colorado	43.9
[a]4	Earlham	57.5	[a]9	Wesleyan-NB	45.5	[a]14	Cornell college	41.2
[a]5	Oberlin	55.8	[a]10	Wesleyan-IA	45.5	[a]15	Central	39.9

Note [a]indicates liberal arts colleges and # indicates the number of scientists per 1,000 graduates
Source Goodrich et al. (1951, p. 163)
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undergraduates did not "yet work so hard as in the Western universities (Slosson 1910, p. 20)."

Perhaps Reed, the highest ranking of the colleges derived its values in part from the premise of hard-working Western pioneers. It never admitted applicants conditionally, nor did it accept socially or athletically-oriented ones. It maintained the highest standards for its professors and ensured that its small community kept "the possibility of daily, vital contact between each student and inspiring teachers (Reed College 1911, p. 29)." The respect for students' independence and freedom proved strong, never to be subjugated under "domination or dictation by the teacher (Sissen 1939, pp. 9–11)." Reed also refused to release course grades, "except on request after graduation (Sheehy 2009, p. 34)." Following WWI Reed saw an upsurge of the humanities. From the early 1920s, it required study of Greek and Roman civilization, thus placing freshmen and sophomores largely in the hands of humanities professors. This emphasis on the humanities, however, was not at the expense of the sciences. Reed's science graduates consistently outnumbered social science and humanities graduates (Clark 1992, pp. 115–116; p. 152). As Table 2.7 shows, today only three liberal arts colleges, Reed, Carleton, and Swarthmore, provide genuinely superior education in both sciences and humanities. Other

Table 2.7 Undergraduate origins of Phds by fields of study, 2000–2010

Ranking	Life sciences	Physical sciences	Humanities
1	Caltech	Caltech	St. Johns
2	**Reed**	Harvey Mudd	**Reed**
3	**Swarthmore**	**Reed**	Amherst
4	**Carleton**	MIT	**Swarthmore**
5	MIT	NM I	**Carleton**
6	Grinnell	**Carleton**	Yale
7	H. Mudd	Wabash	T. More
8	Chicago	Rice	Bryn Mawr

Source Adapted from Reed College (n.d.)
Data in the public domain, confirmed by Reed College

schools such as Caltech, MIT and St. Johns (Annapolis) are either science or humanities oriented.

So what conclusions can be drawn about the future of the liberal arts? We have seen that science and the humanities have long been dialectically, as well as symbiotically, related. In the 17th century, modern science, as a system of mathematical explications of material phenomena, emerged to overcome religious ideologies expressed in vague and contested human language. As much a "rational" religion as a way of confirming knowledge, it advanced as part of a liberal education and, with the emergence of technological institutions, it cast itself as a progressive force behind the moral transformation of society. But the two world wars overturned any idea of the religion of science, a religion that could not be questioned.

The humanities survived, and even thrived, especially in liberal arts colleges. However, as at both Wisconsin and Chicago, an emphasis upon the contemporaneity of past and present met defeat, while the powerful research universities, with science as their raison d' etre, became dominant in the nation's overall system of higher education (Geiger 2015, p. 491ff). Thus, any future liberal arts college must succeed in integrating at advanced levels, the natural sciences and the humanities in a curriculum that aims at "humanizing" science. And for this reason, a liberal arts education will continue to be, as Ortega wrote in 1930, "strictly necessary for the life of the man who is now a student (p. 45)."

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