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Nicolas de Condorcet – The French Revolution of Higher Education

A history on how educational ideas become institutionalized

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Summary

This book attempts to bridge the gap between the 18th century French Enlightenment period, represented by our key figure, Condorcet, and the Revolution of higher education through the advent of the then newly-created *Grandes écoles*—including the *École normale supérieure*, the *École polytechnique* and the *Conservatoire national des arts et métiers*—each of which institutionalized a specific educational concept rooted in the philosophical framework of Condorcet. We trace these institutionalized ideas of higher education from their origins within the French Revolution (1789-1799 AD) all the way to the present day. In doing so, we not only examine the forward-thinking and meaningful educational contributions of Condorcet both to France and the world, but also elucidate the distinctive nature of the French higher education system. The French higher education system can be difficult for non-French citizens to grasp without knowing its history due to its historical complexity and the many personages involved its evolutionary growth, and thus we embed this content as we present Condorcet's story.

Readership

The text is aimed at social scientists and philosophers, including both professionals and students, who wish to explore both the current French elite education system as well as its 1789 AD republican origins. The book makes extensive use of current higher education research in a manner that both the lay reader and the research scholar may benefit from its presentation. The book is also eminently suited for any reader who wishes to learn the outlines of Condorcet's educational contributions that effect educational structures to this day.

Keywords

Condorcet, *Grandes écoles*, French Revolution, *École normale supérieure*, *École polytechnique*, *Conservatoire national des arts et métiers*, French Enlightenment, French higher education, Post-Revolutionary France, French Primary Education, French Secondary Education

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Foreword. On ideas and history: the case of Condorcet in understanding today's French higher education system

The current French higher education system is aligned within international standards, *i.e.*, the system today is postcolonial, dominated by virtual worlds, and faces linguistic rather than geographical boundaries. All French higher education specialists are supported by research project incentives coordinated by the *Agence nationale de la recherche* (ANR), which is the French equivalent of the European Research Council (ERC). Teams and networks of individuals are incorporated and blended into the system in order to obtain project-based grants provided by the central agency. This is, of course, of foremost importance to the budding academic, since a career as a higher education professional is based primarily on research-based achievements. University academics are paid for teaching hours (approximately 192 hours per year), but the academic's career evaluation chiefly relies on research-based achievements. Administration is perceived as a secondary activity of lower importance in the French higher education ethos.

Research and teaching are currently undergoing a shift into the digital realm: higher education institutions are providing learning management system platforms such as *Moodle* or *Blackboard*, making possible the inclusion of distance learning to the traditional, face-to-face educational modality that has been the traditional modality all the way back to ancient times. When distance education appeared in France, it was a State-based function housed in a specific institution—*i.e.*, Cned, the *Centre national d'enseignement à distance*, that had been created in 1939. Cned is roughly equivalent to other country's "Open" Universities, but today all French universities are each equipped to support distance education and are therefore not strictly reliant on Cned for online learning. A new generation of digital distance learning has also been made possible via the appearance of MOOC technology (Massive Online Open Courses); in France,

the centralized MOOC-based organization is the France université numérique (Fun-MOOC), and all higher education institutions are challenged to export their best courses to the Fun-MOOC system for propagation to the wider audience. Digital support for research is provided by the HAL platform (“Hyper Articles en Ligne”). HAL is the online publication location for results of all French public funded research and is a primary mechanism for dissemination of scholarly articles and conference proceedings. The digital HAL system will transform the former traditional system, where scientific reviews were artificially segmented by discipline: the HAL system allows review of all disciplines in open format through a single digital portal. Open publication does not limit the types of publications available: working papers, for example, are common. In addition, the diffusion of information is much easier and more efficient via advanced digital means, bypassing the limits that are intrinsic characteristics of traditional libraries.

So then, just what is the current state of higher education French institutions? With Europe undergoing numerous significant change in both political and technological arenas since the 19th century, France has today realized it must concentrate its *local* capabilities in order to be more competitive in international educational rankings. To help achieve this goal, France has developed a gathering of all higher education organizations in regional territories into “super-universities” called ComUEs (*Communautés d’universités et établissements*). The result is an educational structure containing 80 universities and some 400 great grandes écoles gathered into 25 regional ComUEs, nine of which are in Paris, the capital of France.

Does this organization of educational institutions represent the end of the great divide between the medieval universities and the republican *Grandes écoles*? Possibly. The original system of universities and the revolutionary invention of the *Grandes écoles* has largely lost its pertinence in today’s educational setting. Today, higher education has moved towards

“democratization”, and there is a trend towards viewing higher education simply as “tertiary education”, an educational component that merely follows the primary and secondary levels in sequential order. Higher education, too, is no longer “higher”, since the bulk of the population has access to it (e.g., France’s current national objective is to have 50% of a generation of students earn some degree. In 1927, only 1% of individuals held a baccalaureate, but today, some 80% hold a baccalaureate, with 1% holding the more advanced doctorate degree). Higher education today is both digitized and professionalized, assuring vocational education for a mass of students, not only the elite and wealthy. The elite *Grandes écoles*, residing next to the political, industrial, commercial and intellectual centers of power, preserve this social function, but the European LMD (*Licence, Master, Doctorate*) system regards degrees from the *Grands écoles* only at the master’s level. Thus, these institutions have to work on “brand” and undertake new challenges within adult and continued education if they are to survive. The concept of “lifelong learning”, for example, is such a new opportunity and educational systems are also simultaneously diversifying their programs to adapt to different populations. Today’s educational offerings have commodified and democratized education to ever greater extents.

If this is the *current* landscape, how did this landscape appear in previous historical settings? This question brings us to the aim of this book: *to build an understanding of the higher education revolution that took place at the end of European Enlightenment (1789-1799)*. This monumental educational event explains both the origins and the waning of the French dual system of *Grandes écoles* and universities. Our explanation is synthesized with the work of a great philosopher and politician: Nicolas de Condorcet. Through the intellectual legacy of this key thinker of education, we may understand how the doors of a new educative order were opened. This happened at an important moment during French history: the political revolution of 1789 which not only changed institutions, but also fundamental social realities.

It would be difficult to find an equivalent to Condorcet today. Perhaps Gaston Berger (after World War II) would be a good candidate, as that period was also one of reconstruction and major political and cultural shifts (Gaston Berger, as a minister, created a ministry of higher education and democratized engineering schools with the institution of Insa: *Instituts nationaux de sciences appliquées*). It is also difficult to find a true correlation today to that of Condorcet, because during his life, intellectuals were rare; today, there are many intellectuals, but with comparatively less influence due to their wider distribution across the population. This makes the case of Condorcet peculiar to the specific period of revolutionary transition, and therefore a worthy subject of our study.

We also ask a research question in this book: *May we use philosophy to help explain the history of education?* In this volume, we take the case of a single person (Condorcet) who institutionalized his ideas during the revolutionary period. Our book is about historical *ideas*, not just the *history* of those ideas. We examine how ideas were turned into durable realities at this exact period of historical educational transformation. The intellectual works of Condorcet are intertwined with his political career and also his actions within the national assemblies to which he was called to serve. This book does not focus on a biographical presentation of those actions, nor does it target a philosophy of history or the many historical facts of the period. It is also not a retroactive reconstruction of Condorcet's ideas: indeed, Condorcet and his ideas were recognized while he was still alive. What we do seek to accomplish is an examination of the *ideas* of someone who made history, leaving aside the concomitant factors of that history.

We accept that any man involved in a specific situation can transform that situation according to his own plans. Therefore, a situation with great potential transformation, such as a revolutionary period where political power is redefined, can be deeply changed by a single man of ideas (here, Condorcet, inheriting ideas surrounding the French Enlightenment, a man who

was simultaneously a mathematician, a philosopher and a politician). We examine the institution of educational ideas: how a thinker transforms political realities and represents the birth of a new system so durable that it remains valid over 200 years later. The bias of philosophy might be to overestimate the importance of Condorcet as a lone thinker: in actuality, his ideas are the ideas of his time (and we do present the needed historical context when necessary and appropriate to our story) and he did indeed act within assemblies and groups of people. However, the goal of this work is to examine a key thinker, and we therefore focus on the philosophical approach of Condorcet, the philosopher, as well as his work. We conclude our volume by presenting a modern perspective on the historical changes to which he contributed.

We will consult Condorcet's texts to discover his ideas and to trace their consequences all along a period of French history extending over 200 years to the birth of higher education organizations: schools with a specific intention of which he conceived and—directly or indirectly—implemented. We will also take into consideration the broader context of Condorcet's time: the European Enlightenment, the advent of the technical sciences, the rise of the bourgeoisie as a major social event and the role of a capital city such as the city of Paris. We encourage the reader to keep these themes and goals in mind as the text is read.

0. An overview of the research

Normal, Illinois is a small midwestern town within the United States approximately 200 km south of Chicago. Most people who live in Normal nod their head to the improbable name, sometimes wearing printed shirts that say, “*I’m completely Normal!*” What many do not realize, however, is that the name “Normal,” like many towns and cities in the Midwest United States, is derived directly from the French language from the time when the first French trappers explored North America in the mid-16th century. “*Chicago*,” for example, is how the French trappers converted what the indigenous American Indians of the area called their home, *shikaakwa*, meaning “field of onions”, into the French language. The list of Mid-Western North American French names is endless: *Illinois, Detroit, Fond-au-Lac, St Louis, Des Plaines, La Grange, Bourbonnais, Rochelle*, etc. In the case of Normal, the town is home to one of the first and largest teacher preparation universities in the United States, Illinois State University, and the French name for this type of school would be “*École Normale Supérieure*,” hence the name in English, “Normal.” So close is the connection that in 1857, when the school was first incorporated (with legal services by none other than Abraham Lincoln before he became President of the United States), graduates would be called “*Normalites*” (Kolodny, 2014) as they spread over the Midwest United States, establishing primary and secondary schools wherever they went.

This background makes a fascinating connection, too, with the subject of this book, Nicolas de Condorcet, for it was Condorcet, an 18th-century French Enlightenment thinker, who would shake an entire nation, France, followed by the world, with his ideas about education. Condorcet would play a role in the creation of thousands of “Normalites” (as we might call them) as his ideas concerning education, particularly the “*École Normale Supérieure*”, as well as the concept of free, universal education, would give seed to what would later be implemented

into the educational systems, not only in his native France, but also in Germany, the United Kingdom, and the United States.

Condorcet was perhaps not a polymath in the most technical sense, but he came close to that vaunted appellation, undeniably versatile and highly educated in a wide range of subjects. He was a scientist, a mathematician, a political theorist, and what we might today call a “social scholar”. He vigorously worked to integrate his areas of learning into a coherent whole with the goal of the betterment of society at large. He was one of the most “enlightened” of the French Enlightenment thinkers, and his philosophical teachings and theoretical works played a role in the emergence of the French Revolution of 1789. He was one of the youngest “Encyclopedists” of Diderot’s and d’Alembert’s massive work, the *Encyclopédie* (Diderot & Alembert, 1969), published 1751–1765 AD, a truly monumental work at a time in history when various scholarly groups in European countries were each attempting to consolidate all known knowledge into a single printed work, arguably an variation of the earlier centuries’ efforts of the European Scholastics in creating their various *Summae*, massive written tomes that were designed to systematize doctrinal knowledge, most highly epitomized by Thomas Aquinas’ *Summa Theologica* of 1265–1274 AD (Thomas, 1948). Condorcet developed his own version of a French Constitution, the *Girondin Constitution of 1793*, eventually rejected, with the *Declaration of the Rights of Man and of the Citizen of 1789* Constitution (French, *Déclaration des Droits de l’Homme et du Citoyen de 1789*) ultimately selected (Robespierre, 1792), and today’s France’s actual constitution¹. Condorcet was nevertheless highly aligned to many of the goals of the French Revolution and he also played an influential role in helping bring to fruition that immense historic event possible. And, in what can only be viewed as an incredibly ironic twist, although Condorcet was firmly against the death penalty—and even argued that point in

¹ Last adopted with modifications in 1958 at the start of the Fifth French Republic.

the National Convention against the execution of Louis XVI after the French Republic was formed—he himself fell victim to “The Terror” after the French Revolution had occurred.

Why Condorcet, and why today? Because in many ways, Condorcet was a man 250 years ahead of his time. His many “radical” theories and positions are today completely mainstream, so much so that it is difficult to envision a time when such notions were considered innovative. He was the ultimate democrat (with a small “d”), a man who espoused total freedom, supported the vote for women, was anti-slavery, and felt that the application of scientific principles could greatly improve both individuals and society. Are these radical ideas? Not today. But when Condorcet espoused them in the late 1700’s, immediately before and after the French Revolution, he had to fight for nearly all of them because they were so out outside mainstream patterns of thought. Any individual this advanced in thought is a worthy subject of examination, particularly by those within today’s educational world.

There are additional reasons to become acquainted (or reacquainted) with Condorcet. Condorcet was provided a truly rare opportunity that has been offered to few individuals in history: the opportunity to overturn an entire educational system, update it, systematize its standards, and bring a scientific view to its curriculum and administration. Moreover, Condorcet assisted in expanding the range of education to reach *all* individuals, male and female, and with *no direct cost to the student*. Imagine if today primary and secondary schools admitted only boys, charged children for admittance, and did not even require attendance should their parents not wish it. Condorcet was key in changing all of these factors, and today, we now take for granted free (and compulsory) primary and secondary school around the world. Imagine if young girls attending primary school in Illinois today were aware that they can do so—at no

direct cost—in part because of a Frenchman named “Condorcet” who lived over two centuries ago.

Condorcet’s beliefs concerning education may not today immediately catch one’s attention because we have since his time inculcated so many of Condorcet’s views into our school systems that we give them not a second thought, an *assumed reality*. Nevertheless, Condorcet’s views of education as it is connected to democracy and liberty continue to possess currency today in the most powerful of ways. As we see political movements breaking out around the world that often seem to defy basic logic and common sense, we are forced to face a grim question: would all of these political movements be occurring if the bulk of our citizens had been better educated? This question is not meant to sound “snobbish,” but is intended to impartially raise an important question. Condorcet believed intensely in the importance and value of democracy and freedom. He also believed that education played a role in those very concepts. It is difficult—some might say, *impossible*—to have a well-functioning democracy without an educated citizenry, Condorcet and Thomas Jefferson among them (cf. Jefferson, 2012). Education is what permits individuals (who are voters) to think through ideas, understand problems and their root causes, and to be able to make value judgements about what they hear from candidates for political office. Lacking that education, democracy is functioning only in the most technical of forms, with the will of the *politician* rather than the *people* being carried out. Education prepares individuals to be informed voters, able to keep governments “in check.” Condorcet’s great belief in the value of education goes together with his feelings about democracy, because one cannot be truly present without the other. This, in turn, implies once again that Condorcet’s work is of inestimable value today, and that his ideas form part of the foundation for healthy democracies which promote freedom, equality, and liberty.

Condorcet offers hope to today's citizens in that he believed in the nearly limitless achievement capability of individuals. His book (published posthumously), *Sketch for a Historical Picture of the Progress of the Human Spirit* (French, *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain*) (Condorcet, 2004) is considered one of the foremost writings of the French Enlightenment. The work describes how the application of scientific principles can improve the human condition and society at large. Today, there is an entire group of cognitive psychologists who similarly argue that there is essentially no upper limit on human performance, typified by such scholars as K. Anders Ericsson at Florida State University, achieved by a mechanism called "deliberate practice" (Ericsson, Charness, Feltovich, & Hoffman, 2006) that has been empirically studied in the laboratory across multiple disciplines, including chess, mathematics, dance, memory, etc. and many others (cf. Chi & Glaser, 1982; Ericsson et al., 2006). Condorcet, perhaps for different reasons and with a different theoretical foundation, essentially argued the same viewpoint, but *over a quarter or a millennium ago*. This was long before intelligence was scientifically studied, the notion of "g" (a general measure of intelligence) and the intelligence quotient ("IQ") was introduced by Charles Spearman in the early 20th century, and even further before the emerging science of expertise studies was introduced in the late 20th century (Gregory, 1996; Mayhew, 1999). If Condorcet were alive today, how might he have interacted with the scientists and cognitive psychologists studying high human performance today to understand the mechanisms mediating the development of high performance and expertise? It is truly a fascinating question on which to ponder (cf. Amirault & Branson, 2006).

Condorcet is therefore unquestionably a key influential figure in the history of education. It would simply be impossible to state that one possesses a comprehensive understanding of the history of education without knowing at least some of the basic contributions Condorcet made

to the field and that have subsequently filtered throughout the world. Condorcet began as a French revolutionary theorist, but his work, adopted and implemented in numerous countries, has clearly impacted not only France, but the greater part of the world. To be unaware of Condorcet's contributions to education is to be, well, uneducated about education.

Condorcet was far too ideologically organized to apply his theories with thoughtless abandon. For example, he strongly believed in the need for an application of mathematical and scientific principles to education, but he did not thoughtlessly accept the position of any movement simply because it was ostensibly based on science. One excellent example of this is Condorcet's disagreement with *the Physiocrats* (Whatmore, Felix, & Paul, 2013). The Physiocrats (called by themselves *Les Économistes*, but later called "Physiocrats" to distinguish their particular school of thought from other economic theorists) were a group who followed the theorist François Quesnay (1694 - 1774 AD) and are largely considered one of the first schools of economics based on scientific principles (Gide, Rist, & Richards, 1948). The Physiocrats believed that the true wealth of a country arose from the land (in the agrarian sense) and poited one very difficult argument to counter: one can take a country's amassed gold and silver, coinage, art, buildings and even inventions, but one cannot take a county's *land*. Hence, *the land* is the true source and measure of a country's wealth. This is unquestionably an oversimplified view of Quesnay's positions, but it is sufficient for this present discussion.

In spite of a scientifically-based framework erected by Quesnay and his Physiocrats for economic theory, Condorcet argued *against* the Physiocrats. The Physiocrat's emphasis on wealth and related economic themes were antithetic to Condorcet, who felt that freedom and liberty should take precedence over wealth and economics. Science and mathematics were undoubtedly important to much, if not all, of Condorcet's thinking, but in his mind could never

assume a place above the human condition. Thus, in the disagreements with the Physiocrats, we see the impetus within Condorcet that lead him to support, indeed, to substantially contribute to, the French Revolution and its accompanying goals.

A study of Condorcet yields more, then, than enlargement of our understanding of 18th century France: it expands our thinking about liberty, freedom, democracy, and social equality, all of which are, unfortunately, under threat today. It gives us opportunity to examine how science and scientific principles can be applied to achieve social goals. And it helps us understand more fully the goals of education, what they *are*, what they *can be*, and what they *should be*.

Condorcet lived at a time when the educational practioners in France were about to trade in their brown medieval robes for the white jackets of scientists. Looking much farther back to the 9th century to a time when Charlemagne built his Palace School at Aix-la-Chapelle (Barbero, 2004) during the period many medievalists refer to as the “Carolingian Renaissance” (Daileader, 2004), it was for the purpose of teaching the clergy and other church members tools for the propagation of Charlemagne’s view of Christianity. And make no mistake about it: Charlemagne’s efforts were substantial, consequential and long-lived. Even today, for example, we still employ “the textbook” in our schools, an instructional device for which Charlemagne played a pivotal role in establishing within educational institutions. As time moved forward, small “carolingean” schools sprung up everywhere in Europe: in monasteries, in churches, and in Cathedrals. Europe found itself the heir to a growing empire of schools designed in large part to further the aims of the church. But by the early 13th century, the Cathedral Schools, either by design or by chance, began aggregating into larger centers of study with multiple masters to

teach to swelling bodies of students. Thus, the medieval European “University” was born (Daileader, 2001).

The medieval European University was a child of the church, receiving its foundational licensure from Rome (some of the original incorporation documents can be seen today in Paris at the *Institut du monde arabe* (the Arab Institute) as well as in the *Musée des archives nationales* (the French National Archives), but the changes it brought with it were like a force of nature in overturning the method in which education was delivered. The “Scholastic Method” arose (Daileader, 2007; Wulf M de & Coffey, 1907), and coupled with content drawn directly from the ancient *Seven Liberal Arts*, now divided into the *Trivium* (Leff, 1992) and the *Quadrivium* (North, 1992), an entire generation of students studied in Universities with an outward-looking, *disputational* method of learning, rather than the *meditative* and *passive* methods employed in the earlier monastery schools. The University held sway for hundreds of years, and actually continues to do so today, except that the institution has long since adjusted its methods, goals, and approaches, and now employs a secular approach. Here again, we see the hand of Condorcet at work. Today’s University retains a remarkable endurance and an easily recognized similarity to its original 13th-century incarnation but has today been forged into a broader institution through the efforts of individuals such as Condorcet.

As the 18th century progressed, there were numerous thinkers in France who were both educated and idealistic, unafraid of challenging perceived societal wrongs. They saw the shortcomings of much around them: unequal privilege, wealth by status, power by the Divine Right of Kings, schooling only for boys, and particularly for those planning to enter careers in the church. By the late 1700’s, revolution was in the air, and not only in France, either. For America was, for slightly different reasons, also moving through a period when it seemed that

everything that preceded it would be upturned for the betterment of its citizens. And so, it was. France, a kingdom then over 1,000 years in age, helped the fledgling America win its independence, and within only a handful of years, France would likewise build a democracy on revolutionary principles that touched virtually every aspect of life. This was Condorcet's world, and he played a role both in identifying existing shortcomings and bringing about that Revolution that would permanently address them. Condorcet, then, may be viewed as a "bridge" between the French Enlightenment and the major changes that would overtake the educational institutions of France, and later, much of the world.

To more fully establish Condorcet in our minds in preparation for the main body of this work, let us briefly compare him with another towering French educator seven centuries his senior, Peter Abelard (1079–1142 AD). Abelard, a teacher from Brittany, France achieved his greatest educational fame at the Cathedral School of Notre-Dame de Paris, but for starkly different reasons than Condorcet. The comparison of their differences is beneficial to help us more fully understand the man Condorcet.

Peter Abelard (Alluis et al., 1716; Compayré, 1893) is perhaps best known to history through his famous love affair with Héloïse, yet was, and remains, a towering figure in the 800-year history of the European University. Héloïse, a truly gifted student under the care of her Uncle, Fulbert, found herself thrust into this love affair while she was a student. Héloïse's immense talent in Latin and two even more ancient languages, Hebrew and Greek, had already brought her fame while she was still quite young. Abelard had moved from his native Brittany to teach at the Cathedral School of Notre-Dame de Paris, and Héloïse, as destiny was to have it, became one of Abelard's students.

We have not time here to relate what is often called one of the most powerful love stories in history (Abelard, McLaughlin, Wheeler, & Héloïse, 2009; Mews, 2008), but suffice it to say, both broke their vows to pursue what may only rightly be called a torrid love affair, ending in the pregnancy of Héloïse. She was subsequently “banished” the Oratory of the Paraclete (a deserted building in Champagne), where she took on the role of Abbess to a group of nuns. Héloïse subsequently developed a set of written works that are considered to this day to be a classic set of writings in the history of both the French and Latin tongues.

Abelard was a brilliant and controversial scholar, but he undeniably left a trail of, shall we say, “destructive creativity” behind him. He set his brilliant mind to, for example, the problem of “Universals,” a question brought down from antiquity and which has never been satisfactorily answered to this day. “Universals” were thought to be eternal objects upon which all other objects in life (“Particulars”) were based. Universals were argued throughout the medieval curriculum, with most professors broken into two camps (Brown, 1999): “*Realists*” (who believed, like Plato, that Universals were real, and existed in the eternal “World of Forms”, as Plato would have called them), and “*Nominalists*” (who believed that Universals were simply naming conventions to help us categorize objects into classes to aid in comprehending the world). Abelard’s answer to the thorny problem was to create a *third* position, now called “*Conceptualism*,” which can be perceived as “between” (for lack of a better word) the Realism and Nominalism positions (Peter, 2002). This is an extremely complex question which took up centuries of the University’s curriculum and is not possible to cover the subject any deeper in this introduction.

The comparison between Condorcet and Abelard, both brilliant men in their own unique way, is instructive to help us better understand Condorcet. Abelard worked primarily with

theoretical, philosophical (metaphysical) questions: Condorcet was much more practical, working with the concrete aspects of education. Abelard was absorbed with the emerging University (*i.e.*, Cathedral Schools and what would later evolve into “Universities”); Condorcet was focused on Primary and Secondary education, as well as the new *Grands écoles* (discussed later in this book). Abelard was prone to erratic, often disruptive, controversy; Condorcet was more measured, working through established mechanisms to achieve change. Abelard was flamboyant and pyretic; Condorcet was a man of rules, not subject to emotional trickery to make a point. Abelard was focused on theological truths; Condorcet was focused on the practical matters of educational systems. Abelard exercised freedom to the point of extremism; Condorcet labored to ensure all individuals *possessed* freedom. Abelard’s brilliance laid primarily in his ability to master theoretical concepts; Condorcet’s brilliance laid primarily in his ability to master the practical applications of theory to education. This comparison reveals something about Condorcet, because it shows that, even though Condorcet was a pivotal figure in one of the greatest events in human history, the French Revolution, he achieved his goals without the cloud of destructive creativity that seemed to always surround Abelard. Both men were historically eminent in their own ways. Abelard is still vigorously studied to this day, with innumerable books still being written about him, and about he and Héloïse (as well as Héloïse herself). But in spite of Abelard’s continuing fame, we might be safe in proposing that Condorcet’s works. Though lesser known, have had a more lasting and profound impact on education in France and the world to this day because of his impacts on free, universal, and compulsory education. Abelard’s students, while considering themselves (and rightly so) members of a truly fortunate group, could be numbered in the hundreds, perhaps the low thousands. Condorcet’s work, however, has affected millions of people worldwide, and we might not overstate the case to use the word *billions*. It is a historical irony that the more famous

man (Abelard) likely impacted the field of education only to a fraction of what the lesser-known man (Condorcet) was to do.

In this entry into SpringerBrief's *Key Thinkers in Education*, our author, Dr. Olivier Marty, a French scholar working in Paris at Cnam (the *Conservatoire national des arts et métiers*) brings Condorcet into focus for us. Coming from a family of educators himself, and a graduate of the *École normale supérieure* (among his other advanced degrees), Marty is the perfect modern scholar to examine how Condorcet's efforts have impacted education around the world. Marty's academic works, which include the thinking skills of knowledge workers and their scholarly conceptualizations while at work, fits well within Condorcet's thinking about educational systems and its results within individuals. Marty's applied work, which also includes work at France's National Distance Learning Center (Cnam), has resulted in the development of an economic anthropology of the knowledge diffusion apparatus, an epistemic anthropology (knowledge) which Condorcet himself would have valued. In developing this book, Marty not only demonstrates why Condorcet is considered a key thinker in education, but he also infuses within his text a both a deep knowledge of the practical aspects of Condorcet's efforts as well as an informed understanding of Condorcet's theoretical work, which retains currency today.

Condorcet's is a fascinating story of an individual who had the rarest of opportunities: remaking an entire national educational system. Along the path of learning Condorcet's life story, we have many opportunities ourselves: the opportunity to reflect on the ideals of democracy, equality, and freedom; the opportunity to investigate the difference between education and instruction; the opportunity to consider the paradox of liberty and equality; and much more. Condorcet's story is a story worth telling, not only for what he accomplished, but

for what he can still teach us today. Condorcet's work is not completely finished, but this 18th-century philosopher has provided us a roadmap that we may still use today to continue education's forward movement towards greater liberty, freedom, and equality.

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1. Introduction: French Higher Education and the New Republican State

Abstract. This chapter presents the dualistic of higher education in France: on the one hand, there are the Grandes écoles dedicated to elite students, and on the other, there are the system of universities for other students. Even though the current trend in France is to gather the two kinds of institutions into a regional ComUE (i.e., Communautés d'universités et d'établissements), this great divide has existed for more than 200 years and still retains its historic division. How did this duality arise within French higher education? We trace the medieval beginnings of European universities and the impact of the French Revolution on higher education in the late 18th century. This revolution of education gave birth to France's Grandes écoles and thus this dualism in higher education. At the origin of this educational revolution, we stress the role of Nicolas de Condorcet, a French mathematician, philosopher and politician who played a major role in the invention of the Grandes écoles. This chapter describes some of Condorcet's work along with a representative description of the Grandes écoles of the period.



The French revolution: towards a new political order

The French higher education system possesses a dual nature. Its sheer complexity led the sociologist Émile Durkheim at the turn of the twentieth century to commit to writing a document for non-French students who were coming to study in Paris. Through this work, Durkheim introduced to the world the divide between France's *Grandes écoles* and its universities, a duality that continues today, more than a century later. Elite *Grandes écoles* selected students to train and master a profession (cf. the French collection of books, *Nos grandes écoles*). Other students, which made up the bulk of learners, studied in *mass* curricula at France's universities. The University as an educational structure was not as popular during the 19th century as today, when education was still the privilege of higher social classes. But this divide was already present, and the French State, as well as French industry, would choose to recruit from the *Grandes écoles*, rather than from the Universities. The *baccalauréat* (similar to the "A-level") was reserved for less than one percent of a generation in the late nineteenth century, whereas it is unusual today for a student to fail the *baccalauréat* (e.g., more than 80% of today's French generation holds this diploma). But what *is* constant is the divide between the most promising students attending two years of preparatory classes in order to take a selective competition for entrance into a national *Grande école* (e.g., the *École normale supérieure*, the *Institut d'études politiques*, the *École polytechnique*, the *École des hautes études commerciales*, etc.), with the

remaining majority of students enrolling in their local university of a nearby town. How did this dichotomy appear, and how was this dualistic system of higher education generated?

The history of the French education system written by Émile Durkheim tracks the beginning of one of the first European universities in 13th century Paris. The corporation of professors and students, protected by both King (*i.e.*, the State) and Pope (*i.e.*, the popular religion), was a place of reading as well as use of the dialectic method of instruction. Eventually, the University would become the place of humanism and Hellenism during the sixteenth century. One would study knowledge for its own innate value, without thought for any particular practical use within civil society. However, in the eighteenth century, the French Enlightenment (bringing with it philosophers such as Rousseau, Voltaire, Diderot, Montesquieu) led to the “Encyclopedists” (the most famous being d’Alembert) to described a “new” kind of knowledge. Science was thenceforth redefined as practical and useful, allowing the teaching of *techniques* (*i.e.*, practical methods) for the transformation of nature and society.

As a consequence, when the French Revolution occurred in 1789-1799, the new Republican State recruited its civil servants from a set of new educational institutions that provided its students with the rudiments of science necessary to apply the new technical policies, no longer drawing from “useless” knowledge based on books and theology from the “old” University-based approach still dedicated to that knowledge (with the exception of the fields of law and medicine, which had already become professionalized). Engineering schools (*e.g.* the *Écoles Polytechnique*, the *Centrale des Mines, des Ponts et Chaussées*, etc.) helped to build the new French state. The *Écoles normales supérieures* were then created to enhance general education and to promote democratic choice. These schools continue to operate in today’s contemporary France’s fifth Republic, generating confusion for the non-French where the divide—and its origins—are not always clear.

It is at this point that we can introduce the key thinker in education represented in this book, Nicolas de Condorcet (1743-1794). Condorcet is perhaps best known as a mathematician (primarily within probability theory) and political theorist (i.e., the eponymous “Condorcet Method” of voting, still studied by political scientists today), but we here focus on the philosophical dimension of his political theory. Carrying the legacy of the “Encyclopedists”, Condorcet played a key role in the French Revolution, being elected in the Assemblies that framed the new State and presenting writings to enhance public instruction. His was the scientific mind who defended the rights of slaves and women. Condorcet argued, and succeeded, in making public instruction a necessity for the newborn democracy. Condorcet also realized that liberty of choice would be without value unless it co-existed with reason and knowledge. This is why he was motivated to help create France’s new public *Grandes écoles*.

Why choose Condorcet for a book on Key Thinkers in Education? Condorcet’s legacy concerning the history of ideas leads us to prefer him over his contemporaries, such as Lakanal, who promulgated the law institutionalizing the *École normale*, the *Muséum d’histoire naturelle* and the *Écoles centrales*. We also choose him over Grégoire, who established the *Conservatoire national des arts et métiers*.

Condorcet, in distinction from Lakanal and Grégoire, was the main thinker bridging the gap between the scientific enlightenment and the new revolutionary higher education institutions during the time of the French Revolution. He can be viewed as the main European curricula designer who transformed the educational ideas of the 18th century French Enlightenment into a set of education institutions that still shape France today. We therefore regard him in this book as an “*education engineer*”, one who took ideas and then implemented those ideas to create *things* in the real world.

We will present Condorcet's influence as a key thinker in education belonging to the French Enlightenment and to the Encyclopedists' movement, bridging the gap between science (Condorcet was a specialist of mathematics from the Academy, but he also worked in the sciences such as physics, chemistry or biology) and the practical application of techniques. Thus, veering somewhat from Durkheim's literary book on French higher education, we will include a presentation of the engineering school *École polytechnique*. This institution was an invention of the French Revolution, preparing its students for the *École des mines* or the *École des ponts et chaussées* so that students would be prepared to labour on civil works programs and infrastructure armed with technical skills derived from a study of scientific knowledge.

We view Condorcet as an 18th century scientist of the French Enlightenment, a member of the flourishing Royal Academies of Sciences and of the bourgeois salons where his ideas were debated. But we also consider Condorcet as a *political* individual, entrusted with State-related duties before and during the French Revolution. His main concern was secular, free and compulsory primary education, and these educational features would be decided upon at the Convention during the French Revolution (though complete finalization occurred a century later via the efforts of Jules Ferry).

In order to enable this general instruction, a method for the division of science into its component elements became necessary. Many institutions were thus created, including the Museum of Natural History, the School of Oriental Languages (arising from the French Enlightenment and Montesquieu, preparing the way for 19th century orientalism), the Central Schools for secondary education, the Institute at the top of higher education, offering a republican place for scientists, and so on. These institutions still shape contemporary France's higher education system, though today in a somewhat different manner (Central Schools, for example, are now regarded as engineering *Grandes écoles*). We will restrict our analysis to but three of these structures, as these represent the highest point of Condorcet's spirit in the realm of

education: first, the *École normale supérieure* (to train teachers for national education); second, the *École polytechnique* (to develop scientists); and third, the *Conservatoire national des arts et métiers* (for application to industry where machines with their technical demonstration are examined). Thus, in this present work, we will not consider Condorcet's groundbreaking works on gender equality and abolition of slavery, or his Revolutionary legacy (*e.g.*, the unification of weights and measures, the civil code, etc.) as well as the details of each school's evolution. Instead, we shall focus on the intersection of Condorcet's philosophy and its relationship to the history of France and focus solely on the institution of educational ideas he triggered through the use of common standards in the anthropology of educational organizations.

2. The 18th Century Enlightenment and France's New *Grandes Écoles*

Abstract: In this chapter, we present the European Enlightenment and the late French 18th century, centralized in the city of Paris, as a specific moment in the history of thought. Ideas were no longer merely speculative: they aimed at transforming the world. It is this “bursting forth” of mathematics and the technical Encyclopedists who wrote on how to operate in the real world. Nicolas de Condorcet, as a mathematician, is one of these individuals, and his work is that of continental pragmatism. As an influential politician during the French Revolution, he transformed pure ideas into concrete pedagogical projects. We describe the conception of a new school for the purpose of training teachers (the École normale supérieure), another to deploy civil works and engineering projects (the École polytechnique) and finally, a school to document, valorize and diffuse the arts of industry (the Conservatoire national des arts et métiers).



The French Academy of Science

It is an axiom that the 18th century Enlightenment brought about a new way of thinking to the individuals of Europe. The great French philosophers of the period developed and promoted useful thoughts, as well as a transformational conception of nature. Science and arts were developed not only for mere speculation or social distinction, as in the medieval University, but these approaches fostered the arts, crafts and industries. This technical turn, quite pragmatic in nature, is a characteristic of a new world in old Europe, possessing both progressive and innovative elements. It later flourished in America but was rooted in the European Enlightenment and its encyclopedic philosophy. “*Learn from experience*” is what Rousseau put forth in the education of *Émile*. “*Transform the world and operate on it*” is the message of Diderot and d’Alembert in the *Encyclopédie*. Mathematics were put forth as a way to operate on nature: analyses describe these undertakings precisely and visual models enabled humans to compute and conduct operations in the real world. The republican *Grandes écoles* fostered this mindset. For example, l’École polytechnique was the place where Gaspard Monge’s (1746 – 1818 AD) newborn theory of geometry was taught but then practically applied to technical drawings in order to build physical structures, such as bridges, as well as to serve the military.

This new philosophy is summed up in D'Alembert and Diderot's *Encyclopedia of Sciences, Arts and Crafts*. This major work of the 18th century, a work in which Condorcet participated, presents a system of knowledge based on memory, reason and imagination and produces illustrations of men at work in manufacturing, thus demonstrating the application of science to real world problems. The French Revolution at the end of the 18th century was a major political event, with the beginning of the Republic and the end of Monarchy. Noblemen and clergymen were put aside, and the "*Tiers États*" proclaimed *liberty, equality and fraternity* for all. France led a war against the monarchies of Europe and wished further to serve as a democratic model for the rest of the world. Condorcet wrote (Buisson, p54): "all nations will listen to France since it claims 'Our laws binding our citizens are grounded on Justice and Reason. Liberty and Equality are the base of our constitution'".

In these circumstances, the new fragile French State also wanted its new educational institutions to illuminate all of Europe and the new world. Democracy was not thought sufficient in and of itself. Educational institutions were conceived both as a way to spread the new 18th century ideas about science, practical philosophy and as a method for enabling all French citizens to participate in democratic life. In this setting, Condorcet became a strategic personality, as he was simultaneously an academic, a recognized mathematician and a political thinker in the European Royal Academies as well as a revolutionary activist promoting a plan for public instruction. As a participant in the Convention (the legal assembly ruling the French Revolutionary State in 1793-1794), Condorcet promoted civil education and influenced Grégoire and Lakanal, who went on to institute new educational organizations (and which were to become known as the French Republican *Grandes écoles*).

What are these institutions? The first is the *École normale supérieure*. The institution is called "normal" after the Latin meaning "*rule*". The school was designed to become a perfect

model for all schools in France. The most promising young people were to be selected and trained by the scientists to become teachers in order to spread the new way of thinking espoused in the new Republic. These individuals were first instructed in Paris, after which they returned to their regional homes to create local *Écoles Normales* (catering to primary school teachers) and *Écoles centrales* (the new revolutionary schools planned to replace medieval Colleges and to serve as departments of secondary education).

After the *École normale supérieure*, which mirrored Enlightenment ideas in France and helped to propagate those ideas to the world, a second Grande école was established in order to prepare students in the sciences for engineering schools: this institution was called the *École centrale des travaux publics*. It was soon renamed as the *École polytechnique*, and it was designed to select and train students in mathematics, physics and chemistry in order to prepare them to enter into older royal schools to help build the nation using the latest techniques.

Civil careers were dominant, but the schools also served the army by training future military officers. After the French Revolution, Napoléon I helped to redefine the pedagogical goals of the schools by using science not only to build bridges and place mines, but also in the domains of artillery and naval construction. Thus, France became a model both of scientific ideas and of educational organizations. French scientists became globally known, and the colonization era led to duplication of the system of Grandes écoles in many of France's colonies. The revolutionary schools of the newborn Republic were henceforth a bifacial instrument serving the grandeur of the French nation.

Last, but not least, the *Conservatoire national des arts et métiers* was established at a transformed 16th-century Parisian Abbey to serve as a museum and a school designed to preserve the machines, crafts and techniques of the medieval corporations. The French Revolution, with the *Chapelier Law*, destroyed the medieval corporative system of masters and fellows, but in order to preserve the practical knowledge and expertise of these medieval

institutions, a central organization became necessary to create. This last institution, though less revolutionary and more conservative than our first two examples, was the brainchild of Henri Jean-Baptiste Grégoire (1750 – 1831 AD). However, Grégoire's debt to Condorcet's scientific and political legacy is important through his service to professional and lifelong education. This information establishes the background necessary for us to move on to our key thinker in education, Condorcet himself.

3. Condorcet: A Key Thinker who Opened the Gates of the Revolution in Education

Abstract: In this chapter, we focus on Condorcet himself, as a mathematician, philosopher and a “politician of education”. We describe his personality and the social background that made him a model case of the moral shift which occurred during the French Revolution when all social classes were reorganized. We bring forward a few of his more well-known theories, like the “paradox” between liberty and equality in education, which was ultimately resolved by the fraternity that unified the new society. We highlight the distinction Condorcet proposed between instruction and the development of knowledge vs. moral education. We briefly present Condorcet’s architecture for a new system of public instruction, which was constructed in five levels. These ideas, launched during the French Revolution, would take many decades to be fully implemented, with free, secular and compulsory primary schools appearing only during the 19th century. Condorcet is celebrated each time the French Revolution is remembered and, with the 1989 bicentenary of the Revolution, was formally recognized as a premier international thinker. Condorcet’s works were subsequently translated into many languages to serve a worldwide audience.



Nicolas de Condorcet

Condorcet was an important thinker of the 18th century French Enlightenment and played a key role in the French Revolution via his reports to the Parliament for establishing a public instruction system and through his five written works on public instruction. He promoted a progressive view of humanity improving itself via the application of knowledge. He was a mathematician by profession and was influenced by the philosophers within Diderot's *Encyclopédie*. Condorcet belonged to European academies and scientific societies long before he became engaged in politics. He is perhaps most famous, particularly in political circles, by his development of a social arithmetic in order to avoid what he called a "voting paradox", in which an election system could result in an inaccurate representation of the voting public (also called "*the paradox of voting*" and "*Condorcet's Paradox*").

History, however, did not immediately honor Condorcet. His name became known once again at the end of 19th century when Jules Ferry instituted France's primary schools, inspired by the Condorcet's principles of free, compulsory and secular primary instruction. Later, Condorcet's work experienced another renaissance during the celebrations of the bicentennial of the French Revolution (1989) when some French books were written about his influence in the education sciences and in politics. It is at this time when Condorcet's ashes were transferred

to the French Pantheon (an honor accorded only to France's greatest historic patrons) in the presence of then-President François Mitterand, and placed next to the ashes of Grégoire and Monge, both of whom were present at the origin of the previously-mentioned revolutionary *Grandes écoles*, covered in greater detail later in this text.

When some of Condorcet's philosophical works were translated into English, an increase in the number of his readers occurred, and his international recognition grew greatly. Condorcet opened his report to the Revolutionary Assembly for the general organization of public instruction by writing:

“Offering to all human individuals the means to fulfill their needs, to live happily, to know and profit from their rights, to understand and assume their obligations; to help each and every one to perfect one's industry, to be able to achieve social and political functions, to let flourish one's natural talents, and thereby establish equality between citizens: this is the first aim of national instruction and an obligation of justice for the state.”²

There is to Condorcet, oddly enough, a difference between *education* and *instruction*. The new citizen was not morally educated to follow the laws of the previous generation: he was scientifically instructed to be able to think and vote for his own contemporary laws. Instruction is a matter of social equality and of liberty: citizens cannot be free if they do not possess the skills of reading and writing, skills needed to create democratic rules. Condorcet therefore felt that revolutionary motto of France in 1789, “*liberty, equality, fraternity*”, relied squarely on public instruction. There is however a paradox in this, one stressed by commentators of Condorcet's writings: the moment children are placed equally on the benches of a public school, it is unavoidable that the liberty of a minority (who will work harder) will lead to inequalities

² All translations in this book are the responsibility of the author.

at some point, perhaps in their future knowledge of scientific principles or even in their eventual professional occupations. Therefore, oddly enough, to Condorcet, *the liberty to work harder leads to the inequality of merit*. However, this so-called “paradox of liberty” and equality in education is partially solved by the last term, “*fraternity*”: there is a *social solidarity* that leads those instructed best to participate in the *global* wealth and progress of human mind, thus benefiting *all* members of society.

Fraternity, then, in the mind of Condorcet, solves the paradox of liberty versus equality. This can be deduced through two arguments developed at the beginning of Condorcet’s report for establishing public instruction. First, economic fraternity: “*The nation has to direct instruction so that the perfection of arts increases the benefits for all the citizens and the art of all those cultivate them*”. Public instruction increases the public wealth and binds each citizen together with a common bond towards a richer society. The second argument is more philosophical and concerns the progress toward knowledge. Condorcet writes within his report a few lines later: “*...for each generation, the will to develop physical, intellectual and moral faculties, and thereby to contribute to the general and gradual perfection of human species, is the last goal towards which all social institution should be directed: this is again the object of instruction*”. Even in the most difficult moments in a jail before his death, Condorcet wrote about his faith in the progress of humanity toward a wealth of knowledge. He believed that instruction is a means serving to this end: instruction provides a solid foundation on which citizens can rely to move toward that society of knowledge.

As to this legislative proposal, Condorcet wrote:

“we think, in this general organizational plan, that our primary attention should be, on one hand, to have education as equal and as universal, and on the other hand, [to have education] as complete as it is allowed by the circumstances. We have to equally give to everyone the instruction possible

for the whole society, and we should not refuse any citizen the highest instruction possible to share with the mass of individuals. First, because it is useful to those who receive it, and second, because it is useful even for those who don't receive it".

There is therefore equality of the base, common grounds but also the liberty to reach the summits. We earlier saw that *fraternity* is the mechanism that allows the solidarity between the summit and the base that makes the highest knowledge useful even for the one who is still on the first level. This is an example of how Condorcet's educational plans are fully entwined within the revolutionary motto, "*liberty, equality, fraternity*".

Further, Condorcet felt that a "revolution" contains a rapid movement towards freedom, and that freedom is possible only through a true aristocracy where the wise are ruling. Education assists in the establishment of an aristocratic government, which will, in turn, free the people. This notion recalls an important distinction that Condorcet made between "education" and "instruction". Whereas *instruction* deals with scientific knowledge and the nature of things, *education* concerns moral behaviors and human societies. Condorcet mainly promotes instruction, leaving the citizens free to determine their own view about education. This led France, a century later, to create a *Ministry of Public Instruction*, later replaced in the early twentieth century (since the distinction by that time was forgotten), by a *Ministry of National Education*. We will add to these historical facts to the words of Condorcet, where the Latin roots show an evolution from vertical elevation ("*in-struere*") to horizontal effects ("*docere*", from "*dux*", meaning instruction). Considering these historical and etymological developments, as well as the current acceptance of these terms, we will not rigorously enforce the distinction in our own writing, even though we are conscious of the important distinction of the word "instruction" within Condorcet's own written works. In his writings on public instruction,

Condorcet stresses instruction as a necessity to ensure freedom and equality in a society grounded on reason. Moreover, he considers instruction as a necessity to enhance the knowledge of the masses, with everyone possessing a basic equality (*i.e.*, to choose the right laws) and being free to perfect his or her own genius (for the benefit of the collective). Finally, yet importantly, Condorcet viewed instruction as a method towards *personal* growth, accomplishing one's own potential, and positively impacting others.

At the time Condorcet presented his report on the *Organization of Public Instruction*, France, of course, already possessed numerous historical institutions. In the higher education arena in 1789, for example, France possessed 22 universities. Therefore, Condorcet's fivefold division of educational institutions (*i.e.*, primary schools, secondary schools, institutes, lycées and, finally, science societies) were envisioned to take place over centuries of time through major transformations (*e.g.*, Jules Ferry in the 1880's for primary education) in addition to that already present (existing Lycées would become secondary education, Écoles Centrales became engineering schools, etc.). However, the spirit of the Enlightenment remained within these republican institutions, focusing on knowledge and instruction and the desire within France to model these reforms as suitable for world dissemination.

The nation of instruction, in Condorcet's mind, would separate *political power* from the *diffusion of knowledge*. There would be no corporations of masters (as existed in the medieval period) no State programs, and the National Assembly would have no power over the various educational structures, since "knowledge is the enemy of power" (*i.e.*, knowledge dissipates the "fog" that supports rule over the ignorant). To ensure freedom, and that no church or belief will be imposed upon students, even the Constitution of the nation will be taught as a *social fact*, and not as a *sacred reality*, open to reason and debate. Durkheim, who developed the social sciences in France a century later, likewise adhered to this same view and attempted to

rationalize the revolutionary ideas which had been sacralized by many after the French Revolution had ended.

Today, Condorcet appears as a precursor to the social sciences, calling for a science of morality and social mathematics. His legacy is a country where everything can be discussed freely, because all citizens have been taught common ground for debates: a vocabulary, values, such as science, and the legal limits defining the legitimate space of discussion and disagreement. Condorcet, too, was an icon of this revolution for another reason. Raised in *provincial* France and belonging to an ancient aristocratic family, he embraced the career of science and mathematics in *Paris*, not in the provinces. In the 18th century, Paris was the center of knowledge in Europe, as well as the world. It is within this “scientific” capital, home of academies, receptions, savants, royal institutions and schools, etc. (cf. Belhoste, 2011) that Condorcet was trained.

Condorcet’s transition into politics to serve the French Revolution and to create the educational institutions that we will later present in detail therefore represents a “bridge” between the old nobility and the “new” Paris, a city impacted by the French Revolution and now shining with new sciences and with a new political order. Revolutionary Paris, for example, constructed an astronomical observatory, a variety of museums, schools of engineering and of knowledge, and a conservatory of machines and crafts, to name but a few. Condorcet therefore embodied the continuity of the revolutionary/evolutionary France, preparing a new world to come, “*the West*” as we call it today.

And although Condorcet represents France in “scientific” Paris and not in the provinces, he was not a typical bourgeois. Political scientists and Marxist theoreticians have shown how the French Revolution, with the rise of the “*Tiers-État*” (*i.e.*, the “Third Estate,” which represents the majority of individuals in France), in addition to the nobility (*i.e.*, the “Second Estate,” or the clergy), legalized the status of the new emerging class of individual bourgeois.

Condorcet was a member of the segment of the nobility embracing science and giving birth to the new educational institutions that would eventually permit the bourgeoisie to be recognized and honored later in 18th century. Belhoste in the *Polytechnique*, within a bureaucratic society but ruling as a prepared technocracy, is but one example. The Écoles normales, the preparatory schools that would take a century to become fully established within France, eventually replaced the clergy and the priests in each French village within the new Departments (100 in total) created after the Revolution. The bourgeois moved on to become scientists, technocrats, teachers, and found their place in the new revolutionized political order that had been created.

Condorcet and the French Revolution established the contemporary French Republican school: public instruction would only later be turned into national and higher education structures. Individuals were to be free, equal and fraternal within this unique system. The influence of family, church and other informal learning institutions were no longer intake factors in order to provide every individual the same chance to succeed in the system. Children were taken at an early age (today, at three years of age) until they reach the Grandes écoles, where the elite of the nation are prepared for the highest professional functions, with the Ecole nationale d'administration, the newest school of public affairs, representing the paradox of this paradigm. Pupils were brought up by the State formed through the 1789 Revolution, and not by family or other means. Public educational organizations established the learning paths for the children: first, primary and secondary schools; next, preparatory classes; then, finally, the Grandes écoles, etc. This educational system is very different from the that of the *Ancien Régime* where the family would pay for a preceptor/teacher for private lessons and then send their children to college or university as determined by their family's social origins. The French State no longer encouraged communities or groups between the centralized system and the individual citizens; even the notion of educational community (the group surrounding the children of a class, represented by all the parents, the teachers, the headmaster, etc.) was controlled by the

school, and the school by the State. Condorcet, a proponent of the use of education to produce *citizens* (a fundamental concept of the French Revolution), established a centralized system and documented within it the revolution-based ideas that continue to frame the French educational system today. Even the current 21st century use of mathematical performance scores to select the elite pupils (and, we must remember, Condorcet was a mathematician) is based on the fact that family influence plays a diminished role for performance in this discipline. (In contrast, literature and other subjects can be more fully learned informally at home depending on the literary proclivities of parents and the presence of books in the home, leaving inequalities among the children.) The field of mathematics was therefore viewed as a more egalitarian method for selecting elites.

To conclude we will quote Arago, a biographer of Condorcet:

“Convinced at an early hour that the human species is indefinitely perfectible, Condorcet ‘looked at his care for hastening human progress as one of the dearest activities, as one of the first obligations of a man who enhanced his reason by study and meditation’” .

Condorcet can therefore be viewed as an eminent representative of what Todorov called the “spirit of Enlightenment”, encouraging autonomy, humanism and universalism.

In our next chapter, we will present three state educational organizations which support the reproduction of French Republican society. We move from the most general to the most specific and practical. First, we will focus on the preparation of teachers who model the “genes” of the revolutionary culture produced by the French Revolution. Secondly, we will examine the technocracy based on science and its applied mathematical genius. Last, we will examine the craft artists who manipulate the industrial machines and engines, the most concrete part of the social reproduction system based on schooling. For each of these institutions, we will focus

both on their original foundational ideas and roots within the French Enlightenment, represented by Condorcet, and then focus on curricula and governance, including each organization's **decorum**, as well as a typical lesson in each. The three Grandes écoles, the *École normale supérieure* (ÉNS), the *École polytechnique* ("X", a sobriquet given in honor of the variable "x" used in mathematics), and the *Conservatoire national des arts et métiers* (Cnam), are known as the schools of the third year of the new republic (or the year 1794, using today's date system). In the revolutionary calendar, following the seasons, X (the École polytechnique) was created in the month of "*Ventôse*" (named after the wind), ÉNS (École normale supérieure) in "*Brumaire*" (mist) and Cnam (Conservatoire national des arts et métiers) in "*Thermidor*" (heat).

4. Methods for Examining Educational Organizations: Pedagogy, Curriculum, and Decorum (Location)

Abstract. This chapter describes the methodology of our work. We present a selection of texts from Condorcet that we have translated into English that will assist us in presenting his ideas. We discuss the choice of educational organizations that we will study (the three Grandes écoles: ENS, X, Cnam) and the method for examining each. Our method of educational organizations analysis is threefold, with the presentation of the pedagogical intention of the institution (i.e., the institutionalized educational idea), its curriculum (i.e., the learning paths of the selected knowledge to be transmitted) and its settings (i.e., the locations and decorum chosen to implement the pedagogical idea).

In the following chapters, we will describe several educational organizations arising from the application of Condorcet's educational philosophy. We begin by examining three *Grandes écoles*. Our writing is developed from principles derived from three of Condorcet's works: the *Report on the General Organization of Public Instruction* (presented at the *Comité d'Instruction Publique*, the revolutionary committee that instituted all new schools, universities and primary and secondary education organizations); the 4th and 5th *Memories on Public Instruction* (which focused on higher education and vocational education); and the 9th and 10th chapters of perhaps Condorcet's most well-known work, *Outlines of an Historical View of the Progress of the Human Mind*. It is in these chapters that Condorcet describes the contemporary advances of sciences during the late 18th century, and the new society of knowledge that, we might be surprised to find, anticipates the 21st century's knowledge economy. These documents are included within the bibliography at the end of this book³. Some of these works have been translated into English, but we have chosen to develop our own translations in order to provide stylistic unity.

We will reference the main educational ideas found within Condorcet's written works on how the new Republican State is to be instituted through the *Grandes écoles*. These are Condorcet's conceptions of a school specifically created to train teachers (*École normale supérieure*), one specifically for the technocracy (*École polytechnique*) and one specifically to preserve industry (*Conservatoire national des arts et métiers*). We have omitted other concurrent educational ideas that were instituted through the French Revolution, including an institute for Oriental languages and civilizations establishing the new field of Oriental studies, a museum for Natural History to address the blossoming field of French biology in the 19th century, a national observatory for astronomy, and more. We have selected and limited our examination to these three educational organizations for three reasons: their proximity to

³ Extant are also a few pages that Condorcet wrote for the education of his only daughter.

Condorcet's visions and plans, their international notoriety and our own personal educational experience as a student in two of these institutions which provided additional direct empirical knowledge about these institutions.

For each of these three organizations, we will present its revolutionary history, relying on Condorcet's visions and quotes to support our narrative. This history will lead us to carefully present the *initial pedagogical project* (*i.e.*, the "ideal student", including where the student comes from and where he will work after schooling) and the subsequent *curriculum* (*i.e.*, the normal learning path followed within the school), with its evolution until the present time. We will also illustrate the *setting* (*i.e.*, location and decorum) and everyday life within the school through both pictures of the building and ethnographical descriptions.

5. The “École Normale Supérieure”: Training Professors

Abstract: In this chapter, we apply our method of analyzing educational organizations to the case of the Ecole normale supérieure. We present the pedagogical intention of the school as conceived by Condorcet to train teachers and to develop selected aristocratic minds for the benefit of the new Republic. The historical evolution of this project is detailed until the present time, including the merging of the four Écoles normales supérieures with ComUEs. During this period, the curricula of the schools are replaced through the evolution of scientific disciplines. Finally, students' ethnographical materials of everyday life within the walls of the original school will be presented, including vernacular language and expressions.



The front door of the Ecole normale supérieure

The new school, the *École normale supérieure*, conceived by Condorcet and instituted by Lakanal in 1794 (year III of the new Republic) was established to prepare professors. Its specializations were not the ones covered by medieval faculties, such as law and medicine, but the emerging specialties of literature and sciences, which were to become fields of study only during the 19th century. In the 20th century, the *École normale supérieure* generally trained those in the physical sciences, as well as mathematicians, due to the emergence of the new hierarchy of disciplines, and the use of mathematics, rather than literature, as a selection process for students at the high school level. The *École normale supérieure* was also to become a cradle from which elite civil servants and high executives of the government were chosen, diversifying the destiny of its students. But in 1794, when this pedagogic project was conceived, the aim was to nurture scientists and professors for the newborn Republican State. Bouglé (p.43) stated this succinctly: “Since the School is a source of professors, it is therefore [also] a source of savants”.

In his 5th written work on public instruction, Condorcet completes the architecture of his educational system with “instruction in the sciences”. This last part of public teaching targeted those students who would contribute to the elaboration of truth through observations or

discoveries, thus ensuring the happiness of coming generations. This instruction was necessary to train teachers for common education and people who will work in professions where a knowledge of science is necessary. The nation would need a well-balanced institution in the capital city to “perfect the knowledge of the prepared mind”.

Here we can read the foundational thinking behind the *École normale supérieure*, a school where fertile minds will grow in service of the teaching profession and for science-based professions. Condorcet, in his first writing on public instruction, states this concept in “seed” form; “by the discovery of new truths, the human species will keep on with its self-perfection”. We also see that Condorcet felt that Paris, the center of the nation’s intellectual life, was the appropriate place for such a school. A few efficient individuals are important to the nation since their complete instruction contributes to the common good of the whole humankind. Condorcet continues: “It is important to have a type of public instruction that does not leave behind any talent” and attempts to move any budding genius towards his or her highest limits for the sake of society, and “multiplying the humans dealing with a kind of truth, we enhance the hope to find new truths, since the differences of their own minds correspond greatly to the different difficulties of discovery...”. Anticipating a view of the progress of humankind, Condorcet also states that “the more the human spirit will have discovered new truths, the more it will be able to keep and combine them. This infinite perfectibility of our species is, I believe, a general law of nature”. And it is for the sake of perfectibility and the progress of humankind Condorcet envisions that a special school called the *École normale supérieure* must be established to spread the new truths and methods to the best minds, individuals who are capable of both disseminating these truths to all parts of France and contributing to their growth. The school should be located in Paris, drawing students from every province of the national territory, since “the individual obliged to leave his birthplace will need to acquire more ideas than the one who will remain at the same location.” And these new ideas will help foster a change in thinking and the intellectual

habits necessary to follow the course of history and permanently keep up with the evolution of the world.

In his 5th written work on public instruction, Condorcet describes the books necessary to support this type of instruction. These are not a standard or normative range of books of methods, like those employed in primary and secondary schools: exceptional scientists will demonstrate the path of science and their discoveries directly to their students through *their own* handbooks. These scientists will be seminal in implanting the seed of knowledge, supported by tutors carrying out discussions with students using the handbooks to reach the highest level of instruction found within the tree of knowledge. The handbooks written by the scientists are discussed within the school, between the teachers and their pupils. The German idea of *seminars*, where “seminal” ideas are spread in small classes, will also be adopted. These are named “*conferences*”, and later, this model will be used in French Universities where assistant professors are named “*maîtres de conférences*”. Thus, the school is *normal* or *normative*, guiding the rest of the nation along a “right” or “straight” path (again, a reference to the Latin root of the word “normal”).

The first conferences are described in 1810 within Éns’ internal regulation book as teaching that would not be didactic, but rather, based on *discussions*. Pupils describe their difficulties, present their own works and their own questions of philosophy, history, grammar, etc. The entire class participates to develop collective answers. The “*repetiteur*” oversees the conference, often a third-year student, not a professor. There is no *ex cathedra* (*i.e.*, “from the seat”) teaching as found within Universities of the same era. The pedagogy is *active*, as described by Bougle (p.46): “A conference is the instruction of the pupil by himself, the teaching stemming out from his own effort of personal research, with the stimulation and control of his peers. The role of such a pupil is no longer to religiously listen and fill up notebooks. He has to act, to work, to be permanently awake, to think, to formulate and to defend opinions; but

also to be able to understand his fellows' opinions and discuss them". This approach is what helped impart to the student a critical and liberal mind.

The spirit of the school is described as highly aristocratic. Condorcet's view of mind inequalities comes into play here: "The sum of knowledge that it is to be given to each pupil is proportional, based not only to the time he can spend to study, but also on the strength of his attention, to the scope and the amplitude of his memory, and to the precision and fluidity of his intelligence". Condorcet's 1st book on public instruction sets the foundation for this aristocratic school, independent both from social conditions (and therefore equal for the youth of the nation) and relative to merits and the power of the mind (which is, of course, unevenly distributed among the student population, but ultimately used for the benefit of all). Therefore, there is a selective competition to enter the school, and this competition links the curriculum of preparatory classes as well as the whole secondary education system closely to the Éns.

The most intelligent high school students entered the *classe de rhétorique* (which eventually become the *khâgne* or *lettre supérieure* and *mathématique supérieure*). Students prepared for the examination to enter the school during a period of two years. Students who failed to enter this system were directed to the Universities. Preparatory classes were placed in *lycées*, high schools that Condorcet had conceived to be centers of knowledge in each region. However, there was a hierarchy within the lycées between regions, and a few of them, often located in Paris, offered real chances to enter an elite school, *e.g.*, preparatory classes of Henri IV, Louis le Grand, Pierre de Fermat, Montaigne, etc. Therefore, young students wishing to attend such a prestigious national school for a young individual as well as his family, is often linked to a relocation strategy to Paris in order to prepare for this competition (this process has been documented in Stendhal's autobiography).

The curriculum of the school changed greatly over time to adapt to the evolution of sciences and knowledge. We read in the first lessons to be stenographed and compiled, for example, that the students learned about mathematics and ethics. The “moral sciences” described by Condorcet in his 5th work on the subject are aimed to “deliver from all kind of bounds and authority, from all religious or political chains”. Condorcet writes that knowledge is the enemy of political power, since knowledge weakens and dissipates the uncertainties which allows monarchy to command blind followers. To that end, the school was conceived of as *independent from the government*, and the nomination of teachers carried out *by the scientific community*, and not according to the will of politicians.

The curriculum was still based on science and humanities, the common pedestal on which any secondary teaching is based. The concept at work was that in this Parisian school, (which, by the way, existed only a few months in 1794 before being dissolved), an aristocracy of selected minds would be trained to spread enlightenment all over the territory by creating departmental *Écoles normales supérieures* training for primary schools teachers and teaching in *Écoles centrales* as secondary education. Although the school was soon dissolved, it was reinstated later by Napoléon I, and soon began specializing in the training of original minds oriented towards the service of the French State and higher education.

In his 2nd written work on public instruction, Condorcet writes about the teachers that were to be trained. Such teachers, Condorcet felt, should not form a corporation able to protect their own interests, but should, however, possess a common ethos. Condorcet states that “The function of teaching supposes the habit and the taste for a sedentary and well-regulated life; it requires a straight and gentle character, patience and zeal, a kind of dignity; it requires justice and an accurate perception, both flexibility and method”. If everything cannot be learned at school, those providing the examinations should select appropriate pupils, based as much on their morality as on their capacities, to assist in achieving educational goals. Condorcet

mentions further on that “the art of teaching is learned by experience and habit” and hypothesizes that a few months in a normal school (*i.e.*, the original curriculum of four months, not the four-year period now in use today) will not be sufficient to fully prepare a student for the profession. According to Condorcet, if teachers do not engage in other activities, he encourages them to become members of academies and savant societies, and to help local administrations with their skills development. This set of functions is still a reality for former students of today’s Écoles normales supérieures in France.

Today’s Éns primarily enrolls students after a two-year preparation via a highly selective competition process. The four-year curriculum is executed within small classes of about 20 students per discipline. Students are encouraged to live on-site and are paid by the government of France in exchange for ten years of civil service duty. A common competition is taken at the end of studies, called an “*aggregation*”, before secondary education, and most students go on to pursue training at the higher levels. Indeed, as established as early as the 19th century, the school does not prepare the bulk of secondary education teachers as does the Universities but remains elite in nature. In 1880, Fustel de Coulanges described the curriculum as being separated in two first years to broaden general education (“*culture générale*”) and the teaching of methods to prepare erudite minds, and a third year oriented towards the preparation of aggregation and the training of pedagogues and teachers. In the final year, the students learn how to present teaching lessons, employing factual material presented in straightforward, basic terminology to aid in learning the material.

As mentioned, this school was dissolved in 1794, but then reinstated by Napoléon I (thereby acquiring the sobriquet “the ephemeral school”) and continued throughout the 19th century. Since 1903, Éns has been considered a department of la Sorbonne University, both as a “high school for scientific culture and a pedagogical institute”. Four different schools exist today: the main École normale supérieure (as pictured above) in Paris’ 5th arrondissement

(district), where most Grande écoles were born, the Lyon École normale supérieure, which specialized in humanities and social sciences, the technical École normale supérieure of Saclay (south of Paris) and the newborn Éns in Brittany, in north-western France.

All of these schools face the current challenges of French Grandes écoles brought about by adoption of the European Union's *Bologna Process* (an intergovernmental cooperation of 48 European countries in the field of higher education to aid in the internationalization of higher education), as well as the re-partition of the school into bachelor-master-doctorate levels. Indeed, the French selective competition and preparation are not known abroad, and the school is therefore restricted to the awarding of the master's degree level only. There is currently a diversification of curricula and the status of "normalien" (*i.e.*, the ones who took the selective competition) is enriched with the different master's degrees from the schools in partnership with Universities. This model of adaptation is followed by most French Grandes écoles that have begun the process of internationalization. Here again, Éns was the first to undertake this process, followed later by other major education institutions throughout France.

For the sake of international visibility and ranking, since 2010, Grandes écoles and Universities have been merged into "ComUE" (*Communautés d'Universités et d'Établissements*). One example is the old Éns, which is part of the research ComUE "Paris sciences et lettres", and another example is the technical Éns of southern Paris, which belongs to the ComUE "Paris Saclay", all associated with the École polytechnique. This shift of identity leads to problems of both governance and identity which will be further detailed. It is unquestionably difficult for a school to lose its unique identity and its original pedagogical foundation and curriculum in order to be mixed into the mass universities.

In 1931, André François Poncet recalled that the history of the school is closely linked to the history of education in France. This includes the medieval Colleges in Paris, the influence of Jesuit education (*e.g.*, cloister, garden, library, convent and piety of science), the influence

of the Encyclopedist Enlightenment, as well as Condorcet's and Lakanal's plans, the military genius of Napoléon I (*e.g.*, boarding, discipline, the role of civil servants in a centralized power, etc.), and more. We could continue this storyline with the world competition of the 20th century and the Europeanization of France's higher education that now permits Éns to be an actor on the international stage. In this play, we can stress the role of Condorcet's "Bright man": "Contrary to the ignorant, he knows his rights and their limits; he knows when to sacrifice his liberty of will for the sake of his happiness, or the one of the others".

The square architecture of the 1846 school and its dormitory preserves its traditions through its setting. The library, initiating students to personal research, was considered by Andler as the "most beautiful and powerful instrument of higher education in France" (Andler). Students (known as "*élèves*", meaning that they are *elevated* by the institution to a higher standing) share their room with a roommate ("*coturne*"), and teaching generally takes place in small classes ("*salle des actes*") where all the figures of intellectuals trained by the school are listed to commemorate the grandeur of the institution (*e.g.*, Victor Cousin, Emile Durkheim, Jean Jaurès, Jules Simon, Jean Paul Sartre, Louis Althusser, etc.). The school was proud to provide administrators to Universities and most *mathématiques supérieures* teachers, the preparatory classes to other Grandes écoles, such as the École polytechnique, the École des mines, and the École des ponts et chaussées. All their students, the elite of the nation, were shaped by these teachers. Gustave Lanson wrote in 1925: "All vocations can emerge from the house of *rue d'Ulm*; all that can be learnt, taught, researched and be an object of critics and methodological construction is welcome. It is a special school for public teaching."

The spirit of the school is described as *witty*, with a respect for rules and a taste for liberty. It was co-mingled with timidity and pride, confidence and defiance (Utere Felix). There was a vernacular school language, separating the "*cacique*" (*i.e.*, the highest ranked upon entrance to the school, with the year of entrance to the competition being the same year of the

promotion) from the remainder of the class, and designing as “*caiman*” the former students serving as repétitor for the preparation to aggregation. All students occasionally socialized in the “*K-fêl*” (*i.e.*, school union). Since this was a boarding school environment, a collective student life is established through frequent discussions and conversations (which are the permanent trade of ideas) developing the culture of all while also stimulating the personality of the best students. All students, however, worked intensely for examinations as well as for competitions, and for the sake of the scholarship alone that attracted them to the school in the first place.

6. The “École Polytechnique”: Preparing the Technocracy

Abstract: In this chapter we present the École polytechnique as a school that embodied major changes as a direct result of the French Revolution. It was a bourgeois school that selected highly trained students in the field of mathematics. Condorcet envisioned this institution as a school where students learned techniques for developing specialized engineering in mines or bridges, civil works, etc. This is what the French nation and its citizens were looking for during the French Revolution in order to expand the nation’s geographical connections. The school benefited from the Encyclopedists of the 18th century who were attempting to transform the world through science. The school linked scientists and artists and aimed for technical learning goals. The school was quickly revised into a military school with a sense of hierarchy between social functions (that is to say, the advent of “bureaucracy”) and disciplines (mathematics being the most general at the top, with the applied sciences and technical skills depending on mathematical understanding). The school’s curricula were therefore oriented towards the physical sciences. The setting, as well as the school rites, were influenced by the army.



Formal military parade and entrance door of Ecole polytechnique

The underlying educational idea instituted by the *École Polytechnique* is the enhancement of *techniques*. Barère writes on behalf of the *Comité de Salut Public* in 1794: “It is by a wealthy centralization of French population’s work, such as erection of monuments, enhancement of communication, trade, agriculture, that we will reach the best routes on earth and oceans, the best ports, the greatest civil works and that we will ornate every single town with national theatres and magnificent arenas for all”. This national effort was made with the concurrence of the main savants of that time: Monge, Laplace, Lagrange, Hassenfratz, Berthollet, Chaptal, etc., all served as teachers during the early days of the school. They trained the technocratic elite in the ways of science, even though the word “technocracy” had not appeared at that time and would be imported from the United States of America later, during the 20th century.

This institution is embedded in a major socio-political transition: if the French Revolution has been called by Marx a “bourgeois revolution”, the *École polytechnique* is the realization of this description. Indeed, the meritocracy conceived by Condorcet and realized by the school is limited, since most of the students arrive from the newly formed bourgeoisie. The school helped the new social class to find a position in the emerging state bureaucracy and a new hierarchy of knowledge (this was not immediately recognized in higher society, as is evidenced by the use of the sobriquet “X”, representing the variable “ x ” used so often in mathematics, and with students primarily trained in mathematics). Democratization of education was then synonymous with the openness to the bourgeoisie (*i.e.*, the peasants and workers having no access to such a school, nor the former nobility elite staying in the aristocracies of law and medical studies).

The *École polytechnique*, founded in 1794, was a transformation of *École centrale des travaux publics* (the civil engineering central school) created by the newborn French Republic and developed a form of geometric mathematics similar to those experimented within the military-based Mézières school. Bruno Belhoste, in his important 2012 book about the school and the foundation of a technocratic culture, describes the school’s first curriculum and the students. The school was established at a moment during the French Revolution when the army was weak, and effort was needed to increase civil engineering projects. More broadly, the school inherited philosophical aspects of the French Enlightenment and the mathematical revolution, founding a new “nobility” in education. A culture of technocracy and bureaucracy, relying on the glory of recent French discoveries in the physical sciences, was arriving and there was need to frame a body of knowledge as well as develop civil servants to animate that knowledge. The principle of hierarchy in the administrative process found correlation in the curriculum where highly abstract mathematics was used to select students and then applied mathematics and

sciences guide them in their professional lives where they would use these abstractions to rule over concrete cases presented to them by lower levels of the bureaucracy. Belhoste describes *analysis* as the soul of the school, and describes how this teaching in the *École polytechnique*, informed by the esteemed Laplace, influenced the development of mathematics' history. As a matter of fact, teachers and researchers from the *École polytechnique* played an important role in the development of France's successes in the hard sciences. The motto of the school, "*for nation, sciences and glory*", is illustrated by this very fact: the grandeur of the French nation is served by the development of science, for international and historical glory as much as for the sake of development of a technocratic culture.

This vision of a meritocratic technocracy prepared in a polytechnic school funded by the French State can be understood via examination of the evolution of the school system. Since its very creation, a difficult entrance examination had been employed. Preparatory classes, held in Colleges or the newborn Lycées (which were created in 1802 by Napoléon I), were the home of the most promising students who choose this path instead of the University. In the Lycées, students studied abstract mathematics and physics. About a hundred and fifty pupils were selected every year to enter the school, which was located in Paris at the historical College de Navarre (on rue Descartes), where the 21st century Ministry of Higher Education is today located. By the end of the three years of studies, students' average rank would be doubled, and doors thereby opened to applied schools, primarily military, and the remainder dealing with mines and civil engineering (today, computer sciences and cybernetics are an emerging state body, or *corps d'état*, for civil servants and industry directors).

The setting (decorum) of the school in the former College de Navarre implied military dressing and parades for national occasions such as the 14th of July, the *fête nationale* (the annual celebration of the French Revolution). The revolutionary school was militarized after its acquisition by Napoléon I. In the 1970's, the school was relocated outside of Paris, rebuilt in a

new campus reflecting its dynamic to develop in an international world no longer dominated by the French Republic and uniquely located in Paris' fifth arrondissement. The choice of the Palaiseau campus was difficult, but the move launched the school into a new era of modernity. In this new location, the school today now hosts research laboratories and is open to high performing international students, diversifying its historically French student body.

Looking at the school's curriculum, Gillispie (2008) writes that it "...was Monge's dream. He drew a teaching program in the shape of a knowledge tree blossoming horizontally. The frame was encyclopaedist, the spirit positivist; the two main branches were mathematics and physics ... nowhere else in history of sciences such an advanced source of progress localized in a single institution can be found."

Historians opposed the "school" imagined by Monge (the l'École de Monge, conceived of during the Revolution, which focused on Monge's newly developed "descriptive" geometry) and the school of Laplace (focused on mathematical analysis, replaced in 1816 after the Napoleonic era ended). The competition to enter the École polytechnique, developed during the Napoleonic years, continues today to merge these two subjects, with rigorously selected youth (some 300 students per year, generally coming from mathematics preparatory classes), with the school's entrance competition shaping most of the other engineering schools since the start of this revolutionary institution. This culture of *concours* (contest), however, was destined to be replaced through the Europeanization of higher education and the integration of international students, employing the *Éns* to diversify the curricula and serving as a gateway for entrance to the school. Even though it is one of the most conservative schools, predictions about replacing this selection method have been proposed.

Monge's original curriculum project of 1994 in the institution of École centrale des travaux publics is commented by Belhoste: "it is a global project, covering all aspect of student and school life. The first part of the curriculum, entitled 'Object of Instruction', presented a

program of teaching that would be fully endorsed by the legal institution of 1794". The aim of this institution is to provide the necessary knowledge to young citizens so that they might order, direct and administer any kind of civil works project financed by the Republic. This included mathematical knowledge, *i.e.*, analysis and graphic description of objects, the descriptive geometry and drawing of objects (Title 1) but also physical knowledge: general physics and "particular" physics, also known as chemistry (Title 2). The second part, entitled "On the number of students and their admission into the school", concerns school entrance examinations. The number of students was not strictly set, with the exception that no more than 420 entrants would be permitted (article 1). The selection was based on a competition, the French *concours* to enter a *Grande école* that Pierre Bourdieu criticized in his works on social reproduction and inheritance of social inequalities. Even though this word "*concours*" (contest), is derived from the vocabulary of the pre-existing *École des ponts et chaussées*, it was systematically replaced by this examination which was closer to the traditions of the army and of the *armes savantes* (army sections related to scholarship). What was required is simple: knowledge in arithmetic and elements of geometry and algebra, representing proof of an intelligent and diligent mind (art. 3 and art. 12). In addition, candidates had to present an attestation of morality and republicanism from the municipality where they live (art. 2). The pedagogical project of the school calls for centers of examinations disseminated all over France, where candidates would have to be examined by an "assessor" and a citizen chosen by the administrator of the district based on his republican virtues (art. 4, 5 et 6).

The original historical setting is also described by Belhoste in his 1994 work on Monge's project: "new perspectives were opened to teaching by Palais-Bourbon's large rooms. About thirty rooms are reserved to the instruction of pupils". In accordance with revolutionary practices embedded from 18th century science, there was a plan to establish a vast Museum at Hotel de Lassay, including a gallery of models and machines, a library, a natural history cabinet

and a laboratory. For teaching mathematics, Monge envisioned some five teaching classes, four dedicated to meditation, one room for the cutting of woods and stones, one room dedicated to drawing, and a forge for model-making. Each teacher (*instituteur*) would have a personal *cabinet*, open to students, and would be housed inside the school so that the pupils could consult him every day at any time. Apart from the *instituteurs* (teachers), the agents of the school include *artists* (technical staff), *conservateurs* (to preserve the machines and materials) and *administrateurs* (the governing body).

Condorcet, in his important fourth written work on public instruction, opposed professional education for the bulk of society, preferring rather an elite instruction designed specifically for those who will serve a public goal. This elite instruction is necessary for military activity (such as artillery or marine groups) and for the construction of state edifices (bridges, roads, etc.). These kinds of works, for the common good and of general interest, are reserved for the minority possessing specific talents, and are selected for that purpose. This is the very intellectual root of the *École centrale des travaux publics*, which was to train students in geometry. Drawing and mathematics students would go to serve the mine industry or civil works; that school would later serve as a military school to train military officers. Condorcet writes: “Artillery and civil engineering need specific institutions; schools dedicated to the knowledge of these professions”. This description by Condorcet is the essence of the revolutionary *École polytechnique*.

Condorcet, however, was a pacifist, and it is worth remembering that Condorcet’s first report for public instruction could not be directly voted into law due to war. Condorcet the philosopher promotes public defense, but a “defense” based on the science of mathematics and high techniques: Condorcet is not supportive of offensive strategies that would “jeopardize the present for an uncertain future”. If he notes that domination of overseas countries will soon become useless, he also boasts the navigational sciences and their use for trade, instead of for

war. This included shipbuilding skills, navigational skills, and the necessary arithmetic and astronomical knowledge to correctly carry out these skills.

In addition, Condorcet was opposed to the development of a specific school for civil engineers: he believed this knowledge should be disseminated throughout the whole territory via first-level public schools. Nevertheless, he believed an advanced school should be set up in the capital city of Paris. Condorcet writes “the art of building must constitute an important branch of public instruction, since it is relevant for the security and the prosperity of all and that it should be done by enlightened men ... [and] it is an obligation for the public powers to choose these men and instruct them”. An example of this would be the art of technical drawing based on descriptive geometry that will ground the beginning of the *École polytechnique* based on the new geometry created by Monge.

Condorcet finishes his fourth written work on the distinction between societies of science dedicated to applied knowledge in the field of military art or public instruction and the academies, which search for abstract truths. This differs with the contemporary *École polytechnique*: overlooking the concrete aspects of its name which conjure in the mind techniques and practical knowledge, the Polytechnique soon trained scientists (in opposition to *artists*, which were trained at the *Conservatoire national des arts et métiers*). This can be linked to the modern reduction of “science” to applied techniques related to the hard sciences (*i.e.*, mathematics, physics, chemistry, and computer engineering), whereas the essence of a community of scientists debating about any object of specialized studies stands for a weaker epistemological conception in the eyes of the *grand public*. Therefore, the school taught *humanities*, and not human sciences, promoted a conservative and traditional vision falling outside the physical sciences into the realm of the bourgeoisie culture of distinction. Public opinion in France also interfered with the advent in late 20th century of the phrase “technical teaching” to designate the new curricula at high school aiming at absorbing the massification

of secondary education. In these times of moving semantics, the *École polytechnique* remains in a struggle to be categorized as a scientific, rather than a technical, school.

To fully understand the scientific and technical context in which the *École polytechnique* is constituted, it is important to recall Belhoste's 2012 descriptions of the advent of the technocratic era. He writes that during the 18th century France, "the figure of artist emerges. There is an ambiguity in the word, calling both the practitioner of fine arts, painter, sculptor, architect; and the practitioner of useful arts: drawer, engineer, mechanic, and chemist" (p. 107). There is, however a "common vocation for creation. All of them are 'geniuses', independent and entrepreneurs, opposed to stubborn laborers. Apart from chemists, they all have drawing as a language." The artist must be capable of graphically representing people and objects, draw plans, describe machines and fabrications, and possibly develop an accompanying written commentary. This knowledge of the hand is not *handicraft*, but is rather an activity of *conception*. Such a model of education is a product of history, and more specifically, of the 18th century. It possesses a double heritage: one of military education and one of the *Encyclopédie*. Belhoste goes on: "the shape of the Polytechnics curriculum is based on the very principles of the technocratic organization". Knowledge is systematically ordered and goes from the most general principles (*i.e.*, mathematical) to the applied, deducted and concrete formula. The pupil will first learn the theoretical methods (partly during preparatory classes of *mathématiques supérieures* during the first year at the school), then learn how to apply that knowledge to a techno-administrative practice, and lastly, and only as an option, be initiated to this very practice." The application of theory to machines is undertaken mainly after the *École polytechnique* in other applicative schools that are linked to the polytechnical curriculum. All students apply their knowledge in such a school to acquire a particular craft and subsequently choose a career path (*e.g.*, marine, civil engineering, etc.) As Dupont (2000) wrote, "whereas the course of machines is being generalized at *École polytechnique*, research about the use of

machines is undertaken in each applicative school, where they can naturally be experimented”. By the middle of 19th century, the mechanization of French industry became well organized by a well-prepared technocracy. Therefore, the École polytechnique not only trained state civil engineers or military officers, but also prepared executives for private industry.

Here we can recall the 18th century practical turn, a “French pragmatism”, that was witnessed throughout the French Enlightenment: the technical school offered very different knowledge than any of the 22 Universities that existed at that time (*i.e.*, Universities persisted in teaching traditional and speculative knowledge that was not related to concrete action). Mathematics is used at the École polytechnique to visualize, draw and to help to grasp reality: it consisted of general abstractions that lead to *practical* applications to transform the world through useful arts, techniques, machines and their combination within industry. Mathematics allowed human thought to apply operations on physical items and shaped them into a different form; mathematics was abstracted from concrete realities but bound to return to these realities in order to transform them. It is the essence of Monge’s geometrical drawing methods (where the student must measure and quantify precisely to prepare operations) but also of Laplace’s analysis with its application on military ballistics (to calculate and adjust the trajectory of a projectile).

In this view, the sense of vision is first, and then the mind takes these visual sensations to operate abstractly upon them to prepare the work of the hand. This is a very different approach from the preparation of teachers at the École normale supérieure, which gave prominence to speech, emotions, and robust, contradictory discussions aiming at moving individuals. The École Polytechnique was the school of industry and Saint Simonians, whereas the École normale supérieure was the school of intellectual politicians, including such personages as Jean Jaurès and Victor Cousin.

We next examine how the *Conservatoire national des arts et métiers* stood as an alternative position in the dialectic we have just described through its pedagogical goal of a school open to all students.

7. The “Conservatoire National des Arts et Métiers”: Preserving Industry

Abstract: In this chapter, we present a different institution than we have previously examined in this work: the Conservatoire national des arts et métiers. The Conservatoire inherited the outcomes of the industrious 18th century, and its curriculum followed the technical developments of the 19th and 20th century: mechanics, electricity, electronics, computer science, etc. The school was not as selective and aimed at disseminating all industrial discoveries to the wider majority of the population. Situated in the heart of Paris in a medieval Abbey, it embodied (and still embodies) the educational idea envisioned by Condorcet of a popular vocational education school. The wealth of the nation is enhanced by the large diffusion of technical knowledge and the technical “knowhow” this school produces in its graduates.



The entrance door of Conservatoire national des arts et métiers and an engine preserved

The National Conservatory of Arts and Crafts (Conservatoire national des arts et métiers, or “Cnam”) inherited the physical products and devices of the technical developments of new 18th century Parisian science. Its collection of machines and curiosities were brought together to its location into the capital city of Paris and public demonstrations were held to showcase to curious minds the many new discoveries of the time and the operations of their mechanisms. Before the French Revolution, an effort had been made to centralize these resources in a single royal location, just as the *Encyclopédie* attempted to gather all knowledge about these machines into a single book. Condorcet helped give birth to this industrious century and called for public

courses to disseminate practical knowledge and enhance the productivity of the nation, providing everyone the opportunity to learn.

In his 4th written work on public instruction, Condorcet called for technical education that would serve the mechanical professions, *e.g.*, the arts and crafts of the carpenter, shoemaker, wool dyer, etc., now benefitting from the knowledge provided by chemistry, geometry, drawing, and others. However, Condorcet did not describe a specific school where such knowledge could be taught, since each private profession has its own specific technical characteristics. But Condorcet defended this kind of practical knowledge and its related professions, which served private interests and were run by the greater part of society.

Condorcet writes “it is precisely a progressive rise of benefits for poor people that one can expect from a general progress of mechanical arts, the necessary result of a well combined instruction”. This education “will establish equality between the people practicing these arts; this will gather the children of the poor worker with the ones of the rich laborer who can invest some value in perfecting his art”. We see through these words the genetic makeup of the Conservatoire national des arts et métiers: it was not intended to be an elite school, like the École normale supérieure or the École polytechnique, which prepared highly qualified scientists. Just the opposite, it is to be an institution for the people and the mass of society working in private professions. And this is the reality of Cnam’s purpose and its pedagogical project to this very day.

During the French Revolution, Abbot Grégoire was the individual who wrote down and presented his report to the *Comité d’Instruction Publique* (because Condorcet, having been called to address other revolutionary functions, was not able to take responsibility for this duty). Following the ideas of Condorcet, Grégoire asked for a national place to conserve machines useful to industry and to display their functioning in public courses. The idea of the Conservatory of Arts and Crafts, popular and open to all, was approved, even though it took

years to be implemented. The Conservatory found its final location in the Abbey Saint Martin within Paris' fourth arrondissement (district). The 16th century Abbey still serves today as France's "museum of machines". Over time, extensions to the building were built to accommodate laboratories and amphitheatres. The nave of the church, the Abbey where medieval monks of the high middle ages would dine, is today a library. Napoléon I transformed the revolutionary institution into an *Imperial* conservatory, and later, Louis Philippe to a *Royal* conservatory. Today it bears today its original name of a *National* conservatory.

Describing Conservatory learners, Grison (1999) compares them with other revolutionary schools, stating "Although the Conservatory for Arts and Crafts and the École Polytechnique had common roots in the circles of savants mobilized during the revolution, for example in the committee of arts, the two institutions, originally twins, were in charge of different missions, and diverged in spite of operating in the field of sciences and arts: the Conservatory of Arts and Crafts was constituted as a showcase of technological science, whereas the l'École Centrale des Travaux Publics was employed to train future engineers". Hence, this dialectic of savants and artists created a paradox. On the one hand, the École Polytechnique, selecting aristocratic minds from the bourgeoisie and training them to become mathematicians serving its applications, was on the side of the *highly intelligent* and of *bureaucratic* mindset, a smaller subset of the population. On the other hand, the Conservatoire National des Arts et Métiers was open to *anyone* wishing to learn, even though for a short lapse of time it presented a single machine demonstration with its inexplicable magic, and therefore represented the side of engines and popular crafts. The two institutions therefore delineate two different kinds of engineers: the *scientist* and the *artist*.

The pedagogical mission for the development of laborers' and artisans' knowledge was present since the time of Grégoire's report to the Revolutionary Committee during the French

Revolution. However, the courses were *implemented* only in the beginning of 19th century, with the Conservatory serving strictly as a collection of machines during its early years. When the edifice was ready to host lectures, *demonstrators* were appointed to present the machines to the public. The sessions were open to all, without any subscription or requirements of level, and Cnam followed the path of adult education since the time of its foundation. The first chairs saw the birth of an economy in France (with the courses of Jean Baptiste Say, perhaps best known for *Say's Law*, which covered agriculture, trade and industry) but also, a few years later, the development of electricity, thermal power and other physical mechanisms accompanying the appearance of industrial revolution. This lent the medieval Abbey the appearance of a *temple of industry*.

Cnam soon occupied a unique position in Europe due to its practical functions and its broad audience. The complex of collection of machines, functioning both as a museum and providing public courses, is still active today, targeting the field of adult education with modularized lectures about professional topics. The governing board, led by a general administrator, appoints special professors of the conservatory into two schools: *society and management* on one side, and *industrial sciences* on the other. Both host lifelong learners completing short specializations (*i.e.*, a module), a degree within the LMD *Bologna Process* or an engineering degree within the national engineering school hosted by the Conservatory (Ensam, the *École nationale supérieure d'arts et métiers*). We find similarities in today's program of instruction at the Conservatoire with Condorcet's view: "a sum of the technical knowledge to be acquired would be added to the teachings of new know-how, useful to be learned."

Further similarities between Cnam and the two other institutions of the French Revolution (ÉNS and X) are addressed by Condorcet: "by diffusing light on the practice of arts, the nation will have more craft workers and a higher number of good workers ... as a

consequence the true wealth will be enhanced”. This economic perspective is informed by French Enlightenment philosophy: the new State will shine among the nations and will accumulate a treasury of wealth thanks to education, including professional education. The Conservatoire national des arts et métiers is therefore equally a political instrument of the Republican State as are the elite schools, which diffuse pure science.

Looking at this entire system from a systemic view, individuals of all profiles and talents were to have a place “in the general system of human progress.” Those who have great intelligence, but who were born among the working class, would still benefit from this new teaching institution, both for their own sake but also for society’s general advantage. “The one who has talent for mechanics will be distinguished by his inventions in arts; the one with a vocation for chemistry will produce achievements in subsequent arts...”. All people are included in this dynamic of progress supported by educational institutions; all kinds of genius and of social extractions are also mobilized by public instruction. “Those born with a high cerebral activity will find, with this education, subject of occupation, principles to direct it towards real goals; they will not be often exposed to search for what has been found, or what cannot be found; they will know their strength and will not look for what is too hard”. This enormous class of men will no longer be wasted but will find personal achievement that is also beneficial for all.

Here it must be noted that such a democratic perspective grounds modern mass education. The professionalization of education started in France by the Conservatoire national des arts et métiers continue in the present century through professional high schools and vocational university degrees. What would be a society of knowledge without the recognition of vocational knowledge? The very origin of the Conservatoire national des arts et métiers was anticipated by Condorcet, and we see its effects today. Indeed, he wrote about the collections of machine exhibitions in order to instruct the population about their mechanisms, function, and dissipate the hazy mysteries that could be overlooked by the uneducated. “These places would

protect from common illusions in trade, since one would easily learn how to recognize pure raw material, perfect preparations, and the nature of different tissues. A professor would open the cabinet during the workers' days off and would answer questions and solve difficulties. Objects would be displayed following a scientific order, so that each one would easily find one's specific interest". This is the original pedagogy of the Arts et métiers, gathering machines and demonstrating to the common population during spare time from work how they function and are properly used. Condorcet writes in his general report for the organization of public instruction that "instruction should not forget individuals when they complete formal schooling. Condorcet felt that instruction should embrace all ages, since there is no time when learning is worthless", anticipating by this statement today's European policy of lifelong learning in a knowledge society, as well as the continuing education effort which is the precise position of Cnam today in the field of French public educational institutions. Since vocational education makes most sense during adult professional age, Condorcet's call for a lifelong learning is directly addressed by this institution.

8. Conclusion: Institutions Providing Witness to the Permanence of Condorcet's Ideas, 1794 to Today

Abstract: In this final chapter of this book, we present current trends in French higher education, including ComUE (“Communauté d’Universités et d’Établissements”), ANR (“Agence Nationale de la Recherche”), HALSHS (“Hyper Archives en Ligne en Sciences Humaines et Sociales”) and national infrastructures serving a knowledge-based society. France’s three Grandes Écoles are replaced in this new landscape, with its international—not national—boundaries, and we show the pertinence of the Condorcet philosophy of education within this new world colonized by virtual actors. Therefore, we stress in this closing chapter the importance of knowledge in any political revolution, as well as the relationship between education and power throughout history.

Condorcet, known as a mathematician in his youth, is today widely studied as a *political* philosopher with a key role in the French Revolution and the European Enlightenment. His fight for gender equality and abolition of slavery are, of course, standards for today's modern mind. What Condorcet left to posterity concerning education is primarily located in his first writings on public instruction, which concern free, secular and compulsory primary instruction, the very foundations which would be implemented by Jules Ferry and others a century later in France's third Republic (1870-1940 AD). As we come to the close of our work, we take a moment to revisit Condorcet's philosophical contributions, his thoughts about higher education that were instituted during the French Revolution immediately before his death (even if these were signed by the hand of fellows scientists also engaged in political actions, *i.e.*, Lakanal and Grégoire).

We have presented how Condorcet wished France to "shine" across the world through a selective higher education taught by scientists of the Enlightenment: the idea would be instituted by the *École normale supérieure* and the *École polytechnique*, where their aristocratic *concours* (entry contests) remained. But besides Condorcet's elitist vision, he made room for lifelong learning and popular education of the arts and crafts deserving another national institution: the *Conservatoire national des arts et métiers*, which laid the foundations for the modern modularization in ECTS (the European Credit Transfer and Accumulation System, which measures the volume of learning accomplished) and lifelong learning. Education would no longer be reserved to what Veblen described as a "leisure class", but also be given to the masses, a concept laying at the root of democratization in the French Revolution's goal of liberty, but in addition, equality and fraternity.

What Condorcet and the Revolution established was the division between medieval universities and the *Grandes écoles*, a unique division still remaining in France more than 200 years later. This makes the French higher education system somewhat puzzling for foreigners and very often misunderstood. Perhaps even more so as France and Europe are presently not at

the main center of intellectual life and international rankings, calls for uniformity are proposed today. The end of the *exception culturelle française*, the dual system, may occur soon; it is already fading away with the advent of ComUEs (Communautés d'universités et d'établissements), as well as the regional collections of *Grandes écoles* and Universities margining into a single administrative superstructure in order to be more universally visible. Let's detail these arguments and see what they imply.

When Garat commented on Lakanal's proposal to institute the *École normale* (Bouglé, p.25), he writes: "Human reason will be cultivated and developed in order to produce a great result ... : a nation that will become exemplary and a model for the world ... in a time that will be a reference in history". In fact, the Napoleonic era and the colonial 19th century allowed such a model to be diffused to many parts of the world. However, after the two World Wars (1914-1918 AD and 1939-1945 AD), the Universities of America dominated intellectual history for a time and post colonialism erased part of the French national prestige. What parts of the system remain today, with France at the center of the European Union, still attempt to promote science and education in 21st century? What happened to the brand "*France*", defined in the 18th country, where science is achieved in Paris and for which *Grandes écoles* and other education institutions were a way to propagate, or shine, these breakthroughs to the rest of the world ?

In a post-colonial world (which is also a "post-Western" world), multi-civilizational in nature, there remains significant tracks of France's prestigious past. We can find *Écoles normales* in the former French-speaking colonies of Africa, or even Polytechnic institutes in Eastern countries. However, the European attraction through the medieval institutions of Universities (born at a time, the 13th century, when the universe was conceived with the unique center of Earth around which everything would revolve) is stronger than the tropism of Revolutionary France and its *Grandes écoles*. For example, old Arabic or Indian centers of knowledge have been renamed as "Universities" (*e.g.*, Al-Azhar in Cairo), whereas few of them

bear the name of a Grande école. Further, French revolutionary centralism, which housed the majority of schools in Paris despite Condorcet's plan of an equal distribution of lycées *all across* France, has also perished. Since the 1980s, a decentralization movement has led to a new balance between the capital city and the other major cities in larger regions. France's higher education system has increased its attractiveness since 2010 by taking its current 80 universities and 200 engineering Grandes écoles (and as many business schools) and grouping them into 25 ComUE's (Communauté d'universités et d'établissements).

The Communauté d'universités et d'établissements is a regional higher education cluster grouping local educational institutions. France counts 25 such ComUE's, 9 of which are located within the city of Paris. The capital city remains an intellectual figure for the country, especially if one considers international rankings. ComUE's have been created for increased international visibility, and the bulk of highly ranked ComUE's in teaching and research are based in Paris (*e.g.*, "Paris Sciences et Lettres" (including the École normale supérieure), "Paris Saclay" (which includes the École polytechnique) or the "Université Sorbonne Paris cité". This results in provincial institutions generally attracting local students. The geographical map of ComUE's is therefore far from being homogeneous within the geography of France's overall territory. Differing from the medieval guilds of students and teachers which formed medieval Universities, and closer to the State Revolutionary model of the Grandes écoles (completed by the 19th century efforts to prepare top executives for the private industrial sector within business schools), the modern educational institution represented by the ComUE is both a way to attract eminent researchers, teachers and students from all over the world, but also a way to method for responding to the massification of higher education.

Since the French government currently holds the goal of 50% of a generation attaining a higher education degree (the generation who is 20 years old in the year 2025), a complex set of infrastructure is necessary to host such a large number of students. Higher education may

lose its comparative and superiority assertion (*i.e.*, its use of the word “higher” in “higher education”) as it is generally open. It is shifting to become known as *tertiary* education, sequentially coming after primary and secondary education. This education is also professionalized, since it is no longer the exclusivity of a class of *leisure*, trying to be distinguished, but a *corridor to employment*. The distinction between students might be the nature of their curriculum (and here *Grandes écoles* have the advantage of historic prestige for French national residents who know this history), and not the length or number of years of studies.

The French State closely supervises the activity of the ComUE’s and provides a national means to regulate their activity. For example, the *National Center for Scientific Research* (CNRS) is a member of every ComUE, and infrastructures such as the *Online Hyper Archives* (HAL) serves all the institutions of the nation. Research is managed by a system of call for projects, led in France by *Agence nationale de la recherche* (ANR), which is equivalent to the European Research Council. All institutions compete for the grant funding the organization awards.

In this new landscape, *Grandes écoles* (which are now eroding revolutionary institutions), must rethink their model of selection (*e.g.*, preparatory classes set up by the *École polytechnique*, but inadequate for international students) and their curricula (with the rise of the European union *Bologna Process* LMD and the standardization of diversified master’s programs, such as the *École normale supérieure*). Even though the *École normale supérieure* is ranked at the highest levels in international university rankings, the *École polytechnique* stands as the most traditional of the French *Grandes écoles*. However, inner institutional points of view call for change, as declared by Novacq (2000): “We have to double our work to open up such a specific school within French higher education landscape, the system of *Grandes écoles* being

itself often unknown, perhaps misunderstood by international partners”. How can this political evolution of education institution be aligned with Condorcet’s historic educational ideas?

In his 4th written work on public instruction, Condorcet distinguishes two kinds of professions. The first one is dedicated to serving private interests, whereas the second one is for public utility. We have written an essay in English on French education system that theorizes the upcoming of a political power (*i.e.*, the 18th century French Republican State) wishing to transmit and shine its messages to the entire world through knowledge and education. This is a work serving public utility, and any interest of professionals dealing with education. It shows the intertwined nature of philosophy and politics in France, as well as to students from other countries that have been partially influenced by this system throughout colonial times. Our essay also describes the universality of certain mechanisms and how the French Revolution can be taken as a paradigm to understand the rise of a new power and the instrumentation of education. The French Enlightenment can be seen as a typical kind of knowledge-based revolution, and we posit that any political revolution has an epistemic dimension and a will to create a new order based on learning and the definition of reality, especially in our current society of knowledge where new infrastructures (*e.g.*, the Internet, computers, software) create a new political order with its own institutional landscape (*e.g.*, Google, Apple, Amazon, Samsung and the cyber actors colonizing the world).

Studying Condorcet at this moment is a way to understand the force of information and education in any political shift, whether it be in either the 18th or the 21st centuries. Condorcet wrote in his report for the general organization of public instruction, “times approach, when practical utility and knowledge applications will open unsuspected new horizons, when progress of physics will lead a revolution in arts; and the best way to accelerate this revolution is to spread knowledge in all classes of society and to facilitate the ways to learn”. Such a statement clearly anticipates the Industrial Revolution of the 19th century, facilitated in France by the

institutions described in this work. Condorcet's statement may also be taken as a model to think about the new *future* order to our own, and perhaps assist us in thinking of the accompanying adapted international educational institutions that will play a role in that future.

Indeed, we observe that institutions of knowledge, such as universities or schools, are still in tension on the one hand between the *territory* (with their embedded local policies and environment) and on the other hand the *global nature of science* taught therein. Each discipline, at its highest level, has a global referential with interactions with other specialists from all over the world. ComUE's, the French model gathering all *Grandes écoles* and Universities of a region, remain a place for these contradictions: local institutions shining across the world on highly specific issues. Languages and disciplines draw a map of the world with their own frontiers, whereas local powers try to keep a hand on the different faculties and communities of teachers and students through technical and political means (infrastructure, councils, etc.).

Here we can break Condorcet's definition of a revolution as an evolution towards liberty to stress the *revolving* (meaning "revolution" in the kinetic sense of rotation) of an old system returning in a new disguise. Any new political power requires knowledge and education in order to be able to "shine" forth and to ensure the brightness of the territory where it rules. The new leading class promotes new institutions to train its elite, but a few decades or centuries later, these institutions lose their innovative dimension and become traditional places where inherited elite positions are catered to. This is what happened to the *Grandes écoles* as described by the sociologist Pierre Bourdieu protesting against the reproduction of state nobility.

Though Condorcet is more than 200 years behind us, his thoughts still—and should—inform how France, and most nearly any nation, can employ education for the good of mankind.

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10. Key Moments in Condorcet's Life⁴

Any reader of this book can easily see that Condorcet lead a life filled with historically significant events, many generated by he himself, and others thrust upon him from outside forces. This abbreviated summary attempts to distil some of these many key events. This listing, as well as the listing of extant writings in the next section, draws from the more expansive description found in (Lukes & Ubinati, 2012).

1743

- Born
- Named “Jean-Antoine-Nicolas Caritat, marquis de Condorcet” (17 September, Ribemont, Picardie, France)

1754

- Becomes enrolled at the Jesuit College in Reims for primary education

1758–59

- Enrolled at the Collège de Navarre in Paris
- Condorcet's mathematical skills are recognized

1762

- Focuses on mathematical studies by moving to Paris
- Friendship with d'Alembert.

1765–68

- PUBLISHED: *Sur le système du monde et calcul intégral* (On the World System and Integral Calculus; co-authored with d'Alembert)
- PUBLISHED: *Du problème des trois corps* (*The Problem of the Three Bodies*)
- PUBLISHED: *Essais d'analyse*

1769

- Joins the Académie royale des sciences
- Named member of the following academies: Berlin, Turin, Bologna, St Petersburg and Philadelphia

1770

- With d'Alembert, visits Voltaire at Ferney

1773

- PUBLISHED: *Éloges des académiciens de l'Académie royale des sciences, morts depuis l'an 1666 jusqu'en 1699* (*Praise of Academicians from the Royal Academy of Sciences, Dead from 1666 to 1699*)

1774

- PUBLISHED: *Lettres sur le commerce des grains* (*Letters on the Grain Trade*)
- Turgot nominates Condorcet Inspector General of the Mint.

⁴ Content in this section and the section following is loosely based on content found in Lukes, S., & Ubinati, N. (Eds.). (2012). *Condorcet: Political writings*. Cambridge: Cambridge University Press.

- PUBLISHED: *Lettres d'un théologien à l'auteur du Dictionnaire des trois siècles (Letters from a Theologian to the Author of the Dictionary of the Three Centuries)*

1775

- PUBLISHED: *Réflexions sur les corvées (Reflections on Chores)*
- PUBLISHED: *Monopole et monopoleur (Monopoly and Monopolist)*
- PUBLISHED: *Réflexions sur la jurisprudence universelle (Reflections on Universal Jurisprudence)*
- PUBLISHED: *Rapport sur un projet de réformateur du cadastre (Report on a Land Reformer Project)*

1776

- Elected 'secrétaire perpétuel' de l'Académie royale des sciences
- PUBLISHED: *Pensées de Pascal, édition corrigée et augmentée (Thoughts of Pascal, Corrected and Augments Edition)*
- PUBLISHED: *Éloge de Pascal (Praise of Pascal)*
- PUBLISHED: *Réflexions sur le commerce des blés (Reflections on the Wheat Trade)*
- PUBLISHED: *Fragment sur la liberté de la presse (Fragment of the Freedom of the Press)*

1776–77

- Submits mathematical analysis articles to the *Supplément de l'Encyclopédie (Supplement to the Encyclopedia, 22 articles, total)*

1777

- Due to Tugot's demise, Condorcet choses to focus solely on scientific/academic work

1778

- PUBLISHED: *Sur quelques séries infinies (On Some Infinite Series)*
- PUBLISHED: *Nouvelles expériences sur la résistance des fluides (New Experiments on Fluid Resistance: co-authored with d'Alembert & Bossut)*

1779

- PUBLISHED: *Observations sur le 29^{ème} livre de 'l'Esprit des lois' (Observations on the 29th Book of the 'Spirit of Laws')*

1781

- PUBLISHED: *Réflexions sur l'esclavage des nègres (Reflections on Negro Slavery)*

1781–84

- PUBLISHED: *Mémoires de l'Académie royale des sciences (Memories of the Royal Academy of Sciences; five in total)*

1782

- Elected to the Académie française
- Commences defense of human rights with d'Alembert, women's rights and the emancipation of slaves
- Supports the American colonies
- Creates proposals for economic and political reform in France

1783

- PUBLISHED: *Dialogue entre Aristippe et Diogène (Dialogue between Aristippus and Diogenes)*

1785

- PUBLISHED: *Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix (Test on the Application of the Analysis to the Probability of Decisions Rendered by Plurality of Votes)*

1785–89

- PUBLISHED: *Œuvres complètes de Voltaire (Complete Works of Voltaire)* Edited with Beaumarchais
- PUBLISHED: *Vie de Voltaire (The Life of Voltaire)*

1786

- Marries Marie-Louise-Sophie de Grouchy (1764–1822)
- deGrouchy she starts a salon that would be visited by several illustrious foreign and local political figures, including Paine, Jefferson, Morellet, Cabanis, Beccaria, Adam Smith, Olympe de Gouges and Madame de Staël
- Condorcet and Grouchy host in their home the Cercle Social (a women's rights group)
- PUBLISHED: *Traité de calcul integral (Comprehensive Calculus)*
- PUBLISHED: *Vie de Turgot and De l'influence de la révolution d'Amérique sur l'Europe (Life of Turgot and the Influence of the American Revolution on Europe)*

1788

- Finds the Société des Amis des Noirs with Brissot, Clavière, Mirabeau, La Fayette, Consier, Volney and Pétion
- PUBLISHED: *Lettres d'un bourgeois de New-Haven à un citoyen de Virginie, sur l'inutilité de partager le pouvoir législatif entre plusieurs corps (Letters from a Citizen of New Haven to a Citizen of Virginia on the Uselessness of Sharing Legislative Power Among Several Bodies)*
- PUBLISHED: *Lettres d'un citoyen des États-Unis à un Français, sur les affaires présentes de la France (Letters from a United States citizen to a Frenchman, about the Present Affairs of France)*
- PUBLISHED: *Essai sur la constitution et les fonctions des assemblées provinciales (Essay on the Constitution and Functions of Provincial Assemblies)*

1789

- Convocation of the Estates-General
- Terminates Condorcet's attempt to be elected and unhesitatingly joins in the Revolution
- The Third Estate refuses the king's order to the Estates-General to deliberate
- The King orders the clergy and nobility to become a part of the Third Estate
- Interacts with several salons, including l'hôtel de la Rochefoucauld and the club de Valois
- Enjoins liberals, including La Fayette, Liancourt, Sièyes

- Along with La Fayette, Mirabeau, Suard, Jaucourt, du Pont de Nemours, Condorcet contributes to the foundation of the Société des Amis de la paix
- PUBLISHED: *Réflexions sur les pouvoirs et instructions à donner par les provinces à leurs députés aux États généraux* (*Reflections on the powers and instructions to be given by the provinces to their deputies in the Estates General*)
- PUBLISHED: *Sur la forme des élections* (*On the Form of Elections*)
- PUBLISHED: *Sur la nécessité de faire ratifier la constitution par les citoyens* (*On the Need to Ratify the Constitution by Citizens*)
- PUBLISHED: *Réflexions sur ce qui a été fait et sur ce qui reste à faire* (*Reflections on what has to be Done and what Remains to be Done*)
- PUBLISHED: *Au corps électoral contre l'esclavage des noirs* (*Electoral Body Against Black Slavery*)
- PUBLISHED: *Déclaration des droits* (*Bill of Rights*)
- PUBLISHED: *Idées sur le despotisme* (*Ideas about Despotism*)
- PUBLISHED: *Adresse à l'Assemblée nationale, sur les conditions d'éligibilité and Éloge de M. Turgot* (*Address to the National Assembly, on the Conditions of Eligibility and Praise of Mr. Turgot*)

1790

- Starts the 'Société de 1789' along with Sièyes, as well as editing its accompanying Journal
- Contributes to the Bibliothèque de l'homme public (1790–92), the Chronique de Paris (1792–93) and the Journal d'instruction sociale (1793)
- Fails at reconciling radicals and moderates
- PUBLISHED: *Dissertation philosophique et politique sur cette question: 's'il est utile aux hommes d'être trompés?'* (*Philosophical and Political Dissertation on this Question: 'Is it Useful for Men to be Deceived?'*)
- PUBLISHED: *Sur le mot 'pamphlétaire'* (*On the Word 'Pamphleteer'*)
- PUBLISHED: *Opinion sur les émigrants* (*Opinion on Emigrants*)
- *Sur l'admission des femmes au droit de cité* (*On the admission of women to citizenship*)

1791

- Issues a proclamation criticizing the constitution
- Politics become more intense; enrolls in the Club des Jacobins
- Disapproves of the repression of Champ-de-Mars
- Moves sharply to the left after the king's attempted flight in June this alienates many friends and allies by declaring support for the republic and rejecting the idea that a constitutional monarchy is possible
- Elected a deputy of the National Assembly
- PUBLISHED: *De la République, ou Un roi est-il nécessaire à la conservation de la liberté?* (*From the Republic, or Is a King Necessary for the Preservation of Liberty?*)
- PUBLISHED: *Discours sur les conventions nationales* (*Speech on National Conventions*)
- PUBLISHED: *Mémoire sur l'instruction publique* (*Brief on Public Education*; first of a series)

1792

- War is declared

- Supports Brissot’s position on intervention and submits a ‘*rapport et projet de décret sur l’organisation générale de l’instruction publique*’ (Report and Draft Decree on the General Organization of the Public Instruction) to the Assembly.
- With Brissot, is criticised by Robespierre at the Club des Jacobins
- Joins the executive committee known as the ‘commission des Vingt et Un’ and supports sans-culottes and the new Minister of Justice Danton
- Drafts the memorandum which leads to the King’s suspension and the summoning of the National Convention
- Remains silent in the face of the September massacres
- The Convention puts Louis XVI on trial and sentences the death penalty to him against Condorcet’s wishes for a severe penalty that is short of death
- The Monarchy falls
- Elected to the National Convention and becomes president of the Comité de Constitution to develop a new constitution
- The Comité works from September 1792 to February 1793.
- PUBLISHED: *Cinq mémoires sur l’instruction publique (Five Briefs on Public Education, 1791–92)*
- PUBLISHED: *Discours sur les finances (Finance Speech)*
- PUBLISHED: *Sur la liberté de la circulation des subsistances (On the Freedom of Circulation of Subsistence)*
- PUBLISHED: *La République française aux hommes libres (The French Republic to Free Men)*
- PUBLISHED: *Sur la nécessité de l’union entre les citoyens and De la nature des pouvoirs politiques dans une nation libre (On the Necessity of the Union between Citizens and the Nature of Political Powers in a Free Nation)*

1793

- Presents his ‘*Plan of Constitution*’ at the National Assembly on 15/16 February; the Plan is not discussed
- Jacobins, accusing the Plan of promoting federation, form their own parallel committee with Robespierre and Saint-Just, with the goal of drafting an anti-Girondin constitution
- Condorcet’s Plan is rejected in April, and in June the Assembly votes on a constitution written by Héault de Séchelle, the chief of the new committee nominated by the Comité de salut public
- Condorcet writes an *Avis aux Français sur la nouvelle Constitution*, angering the Assembly
- *Sur le sens du mot révolutionnaire and Sur les élections (On the Meaning of the Word Revolutionary and On the Elections)*
- On 8 July, Condorcet is denounced with an arrest warrant issued
- Finds a hiding place in the home of Madame Vernet (rue Servandoni), where he continues to write
- PUBLISHED: *Fragment de justification (Fragement of Justification)*
- PUBLISHED: *Conseils à sa fille (Tips to His Daughter)*
- Begins writing the *Tableau historique des progrès de l’esprit humain (Historical Chart of the Progress of the Human Mind)*
- This is shortened to a Prospectus, called the *Esquisse (Sketch)*
- Writes ‘*à la Convention*’ (*To the Convention*) in which he accuses Robespierre of dictatorship

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- Condemned to death (October 2)
- Requests wife to divorce him so that family assets for their daughter will be protected

1794

- Abandons refuge on 25 March and is arrested two days later at Clamart
- found dead in the prison of Bourg-de-l'Égalité on 28 March

1795

- On 2 April (13th Germinal of the Revolutionary Calendar) the Convention finances and orders the publication of 3,000 copies of the *Esquisse (Sketch)*, presented as '*un livre classique offert à vos écoles républicaines par un philosophe infortuné*' (*A Classic Book Offered to Your Republican Schools by an Ill-Fated Philosopher*)

11. Selected Written Works of Condorcet⁵

It is difficult to create a definitive list of Condorcet's written works. Some of Condorcet's writings exist only in fragments; others are, unfortunately, thought to be lost to history. Here are listed, by topical area, some of Condorcet's key works that are documented by history. All these writings are today available in their original French; a variety have additionally been translated into other languages. Our source for this list is (Lukes & Ubinati, 2012) (see footnote 4 for complete citation information.)

Mathematics

- *Du problème des trois corps* (The Problem of the Three Bodies)
- *Essais d'analyse* (Analytic Tests)
- Mathematical analysis articles in the *Supplément de l'encyclopédie* (Supplement to the Encyclopedia; 22 articles, total)
- *Pensées de Pascal, édition corrigée et augmentée* (Thoughts of Pascal, Corrected and Augments Edition)
- *Sur le système du monde et calcul intégral* (On the World System and Integral Calculus; co-authored with d'Alembert)
- *Sur quelques séries infinies* (On Some Infinite Series)
- *Traité de calcul integral* (Comprehensive Calculus)

Scientific

- *Éloges des académiciens de l'Académie royale des sciences, morts depuis l'an 1666 jusqu'en 1699* (Praise of Academicians from the Royal Academy of Sciences, Dead from 1666 to 1699)
- *Nouvelles expériences sur la résistance des fluides* (New Experiments on Fluid Resistance: co-authors, d'Alembert, Bossut)

Economics

- *Lettres sur le commerce des grains* (Letters on the Grain Trade)
- *Monopole et monopoleur* (Monopoly and Monopolist)
- *Rapport sur un projet de réforme du cadastre* (Report on a Land Reformer Project)

Education

- *Cinq mémoires sur l'instruction publique* (Five Briefs on Public Education, 1791–92)
- *Discours sur les finances* (Finance Speech)
- *Mémoire sur l'instruction publique* (Brief on Public Education; part 1)

⁵ (Lukes & Ubinati, 2012).

- ‘*Rapport et projet de décret sur l’organisation générale de l’instruction publique*’ (Report and Draft Decree on the General Organization of the Public Instruction) to the Assembly

Political

- *Adresse à l’Assemblée nationale, sur les conditions d’éligibilité and Éloge de M. Turgot* (Address to the National Assembly, on the Conditions of Eligibility and Praise of Mr. Turgot)
- *Au corps électoral contre l’esclavage des noirs* (Electoral Body Against Black Slavery)
- *Avis aux Français sur la nouvelle Constitution*
- ‘à la Convention’ (To the Convention)
- *Dissertation philosophique et politique sur cette question: ‘s’il est utile aux hommes d’être trompés?’* (Philosophical and Political Dissertation on this Question: ‘Is it Useful for Men to be Deceived?’)
- *Essai sur l’application de l’analyse à la probabilité des décisions rendues à la pluralité des voix* (Test on the Application of the Analysis to the Probability of Decisions Rendered by Plurality of Votes)
- *Essai sur la constitution et les fonctions des assemblées provinciales* (Essay on the Constitution and Functions of Provincial Assemblies)
- *Fragment sur la liberté de la presse* (Fragment of the Freedom of the Press)
- *Idées sur le despotisme* (Ideas about Despotism)
- *Lettres d’un bourgeois de New-Haven à un citoyen de Virginie, sur l’inutilité de partager le pouvoir législatif entre plusieurs corps* (Letters from a Citizen of New Haven to a Citizen of Virginia on the Uselessness of Sharing Legislative Power Among Several Bodies)
- *Lettres d’un citoyen des États-Unis à un Français, sur les affaires présentes de la France* (Letters from a United States citizen to a Frenchman, about the Present Affairs of France)
- *Plan of Constitution*
- *Réflexions sur la jurisprudence universelle* (Reflections on Universal Jurisprudence)
- *Réflexions sur l’esclavage des nègres* (Reflections on Negro Slavery)
- *Réflexions sur les pouvoirs et instructions à donner par les provinces à leurs députés aux États généraux* (Reflections on the powers and instructions to be given by the provinces to their deputies in the Estates General)
- *La République française aux hommes libres* (The French Republic to Free Men)
- *Sur la forme des élections* (On the Form of Elections)
- *Sur la nécessité de faire ratifier la constitution par les citoyens* (On the Need to Ratify the Constitution by Citizens)
- *Sur l’admission des femmes aux droits de citoyenneté* (On the Admission of Women to Citizenship)

- *Sur la liberté de la circulation des subsistances* (On the Freedom of Circulation of Subsistence)
- *Sur la nécessité de l'union entre les citoyens and De la nature des pouvoirs politiques dans une nation libre* (On the Necessity of the Union between Citizens and the Nature of Political Powers in a Free Nation)
- *Sur le sens du mot révolutionnaire and Sur les élections* (On the Meaning of the Word Revolutionary and On the Elections)
- *Vie de Turgot and De l'influence de la révolution d'Amérique sur l'Europe* (Life of Turgot and the Influence of the American Revolution on Europe)

Various

- *Lettres d'un théologien à l'auteur du Dictionnaire des trois siècles* (Letters from a Theologian to the Author of the Dictionary of the Three Centuries)
- *Réflexions sur les corvées* (Reflections on Chores)
- *Éloge de Pascal* (Praise of Pascal)
- *Observations sur le 29ème livre de 'l'Esprit des lois'* (Observations on the 29th Book of the 'Spirit of Laws')
- *Mémoires de l'Académie royale des sciences* (Memories of the Royal Academy of Sciences; five in total)
- *Dialogue entre Aristippe et Diogène* (Dialogue between Aristippus and Diogenes)
- *Œuvres complètes de Voltaire* (Complete Works of Voltaire, co-edited with Beaumarchais)
- *Vie de Voltaire* (The Life of Voltaire)
- *Opinion sur les émigrants* (Opinion on Emigrants)
- *Sur le mot 'pamphlétaire'* (On the Word 'Pamphleteer')
- *De la République, ou Un roi est-il nécessaire à la conservation de la liberté?* (From the Republic, or Is a King Necessary for the Preservation of Liberty?)
- *Discours sur les conventions nationales* (Speech on National Conventions)
- *Conseils à sa fille* (Tips to His Daughter)
- *Tableau historique des progrès de l'esprit humain* (Historical Chart of the Progress of the Human Mind)
- *'un Livre classique offert à vos écoles républicaines par un philosophe infortuné'* (A Classic Book Offered to Your Republican Schools by an Ill-Fated Philosopher)

Afterword: another day for higher education in France

Condorcet casted light on revolutionary ideas that rose up (with)in new institutions. These institutions supported the shining glory of France all accross the world, up to postcolonial times. But a new day is coming up: with the advent of anthropocene and the burning of our world, how will these institutions get adapted ? Who is the new philosopher who will synthesize education in anthropocene ideas to reset higher education ? What is the next revolution around the center of the universal world of knowledge ? Is it about sustainable development ideas ? digitalization of curricula ? Ecological campuses ?