



HOW EDUCATION BECAME A VARIABLE IN ECONOMIC THOUGHT: THREE TURNING POINTS

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ABSTRACT

This article reconstructs the long intellectual trajectory through which education gradually came to be conceptualised as a variable within economic thought. Rather than emerging suddenly in twentieth-century economics, the economic treatment of education developed through a sequence of theoretical reconfigurations spanning more than two centuries. The analysis identifies three major turning points. The first is Jean-Baptiste Say's recognition of education and knowledge as forms of immaterial wealth embedded in the productive process. The second is John Stuart Mill's attempt to integrate education within political economy while preserving its role in individual development, social progress, and intellectual pluralism. The third is Gary S. Becker's formalisation of education as human capital, fully incorporated into economic theory through investment models, rates of return, and dynamic growth frameworks. By situating these contributions within their broader philosophical and methodological contexts—including Baconian epistemology, utilitarianism, and debates on specialisation—the article clarifies how education was progressively transformed from a philosophical and moral concern into an endogenous economic variable. The reconstruction sheds light on the conceptual foundations of contemporary educational economics and on the assumptions that continue to shape current debates on learning, work, and technological change.

KEYWORDS: Education, Economic thought, Human capital, Knowledge, Specialization

1. BACKGROUND

Before the advent of industrial society, the relationship between education, knowledge, and productive activity was structured around a long-standing hierarchical distinction between *artes liberales* and *artes mechanicae* (Dewey

2004, 270). Rooted in classical antiquity and transmitted through medieval scholastic culture, this distinction assigned higher epistemic and social value to disciplines concerned with intellectual contemplation—grammar, rhetoric, logic, arithmetic, geometry, music, and astronomy—while relegating manual and technical activities to a lower status. As a consequence, the liberal arts were predominantly accessible to dominant social groups, whereas the mechanical arts, associated with bodily labour and material manipulation, were regarded as necessary but intellectually inferior, suitable for artisans rather than for free men.

1.1. Francis Bacon and the reconfiguration of the epistemic paradigm

At the height of the scientific revolution, Francis Bacon advanced a radical and corrosive critique of the inherited wisdom of antiquity and the Middle Ages. His attack spared no intellectual tradition. Bacon directed his criticism against the entire cognitive order that had dominated European culture for centuries, attributing the errors and stagnation preceding the scientific revolution to prevailing forms of education and knowledge transmission (Bacon 2000a; Bacon 2000b).

According to Bacon, classical culture suffered from three fundamental limitations. It privileged verbal dispute over empirical inquiry, cultivated eloquence rather than experimental knowledge, and reproduced a form of sterile learning incapable of producing tangible effects in the world. Knowledge, in this tradition, circulated within closed rhetorical systems instead of being tested against nature. It is from this diagnosis that Bacon's revaluation of the mechanical arts emerges: no longer regarded as inferior forms of knowledge, they appear as central drivers of human progress (Bacon 2000b).

Against the classical culture of the liberal arts, Bacon explicitly privileged experimental science and practical engagement with the material world. When he famously asserted that *scientia potentia est*, he did not conceive science as contemplative knowledge, but as applied inquiry—knowledge oriented towards intervention, control, and the transformation of nature. Scientific investigation was valued not for its speculative elegance, but for its capacity to generate effects, expand human power, and improve the conditions of life (Bacon 2000b).

Bacon's argument was reinforced by his observation that several technical innovations—the compass, the printing press, and gunpowder—had profoundly reshaped the course of history, despite having emerged in largely contingent and unplanned ways. From this insight he derived a decisive intuition: if such transformative effects could result from discoveries made almost by accident, what might be achieved if scientific and technical knowledge were

cultivated systematically? The fundamental obstacle, for Bacon, was not the scarcity of human intelligence, but the absence of an adequate educational regime. An education grounded in science and technology—based on the proper scientific method codified in the *Novum Organon*—would render progress no longer accidental, but cumulative and intentional, opening the possibility of advances without predetermined limits (Bacon 2000a; Bacon 2000b).

Although Bacon lived in a pre-industrial age, prior to the emergence of machine-based production, his imagination was already projected towards the technological world of the future. In his utopian work *New Atlantis*, written nearly five centuries before the present era, he envisaged forms of technological development strikingly reminiscent of modern society, including towering urban structures, submarines, flying machines, anti-ageing therapies, and the artificial modification of living organisms (Bacon 2008).

While Bacon did not contribute directly to the scientific revolution in the same manner as figures such as Copernicus, Galileo, Kepler, or Newton, his influence on the subsequent development of European—and later global—culture was nonetheless profound. His significance lies not in specific scientific discoveries, but in having articulated a new vision of knowledge, one that would exert a lasting impact on the political, cultural, and educational imaginaries of modernity.

This programmatic redefinition of science as an instrument for the transformation of the world inspired two intellectual movements of extraordinary historical relevance: the Enlightenment and, later, positivism. The protagonists of both movements explicitly acknowledged their intellectual debt to Bacon, whose emphasis on empirical inquiry, usefulness, and systematic knowledge provided a shared philosophical foundation.

In the eighteenth century, the most visible institutional expression of this Baconian orientation was the *Encyclopédie*, one of the most enduring legacies of the Age of Enlightenment. Conceived not merely as a repository of theoretical knowledge, the project directed by Diderot and d'Alembert sought to reorganise human understanding by giving unprecedented visibility to the arts, crafts, and technical procedures underlying material production. By documenting practical operations, describing tools and techniques, and rendering productive knowledge public and transmissible, the *Encyclopédie* translated Bacon's epistemological programme into a concrete cultural and pedagogical project.

1.2. Bentham and the economic significance of intellectual labour

Within this broader intellectual constellation of the Enlightenment, a number of thinkers contributed to extending the Baconian vision beyond the domains

of philosophy and encyclopaedic knowledge. Among the most influential figures was the English jurist and moral philosopher Jeremy Bentham. In his *Philosophy of Economic Science*, Bentham explicitly situates his own project within the Baconian tradition, arguing that

The only form of reasoning by which instruction is to be acquired, by which Bacon, for example, and Locke and Newton learnt what they have taught us, is that which proceeds from ‘particulars to generals’. Induction is that form (Bentham 1952, 99).

By grounding economic and moral reasoning in the inductive method, Bentham sought to extend the experimental logic of the natural sciences to the analysis of social phenomena. He makes this ambition explicit when he observes that his philosophy of economic science,

as well as any other work of mine that has been or will be published on the subject of legislation or any other branch of moral science is an attempt to extend the experimental method of reasoning from the physical branch to the moral. What Bacon was to the physical world, Helvetius was to the moral. The moral world has therefore had its Bacon, but its Newton is yet to come. (Bentham 1952, 100–101).

The Newton of the moral world is presented as “yet to come”, but Bentham’s own work can be read as an implicit attempt to occupy precisely that vacant epistemic position.

Although the contours of economic theory remained at this stage imprecise and still loosely defined, this move represents a crucial moment in the intellectual chain reconstructed here. By affirming that social and economic phenomena could be investigated through systematic observation, induction, and evaluation of effects, Bentham contributed to establishing the methodological premises upon which education could later be conceptualised as an object of economic reasoning, subject to assessment in terms of usefulness, efficiency, and social consequences.

Often remembered primarily as a jurist and moral philosopher, and as the central figure of classical utilitarianism, Bentham also engaged directly with economic questions and explicitly framed part of his work as political economy. In his *Manual of Political Economy*, he demonstrated a clear awareness of the role played by scientific discovery, technical invention, and intellectual labour in the expansion of wealth.

Bentham argued that inventions and discoveries, although often produced by individual ingenuity, generate benefits that extend far beyond their original creators. For this reason, he maintained that the products of the mind could not be treated in the same way as ordinary physical labour. Under the general

denomination of labour, Bentham famously distinguished between “the mere bodily energy employed in the production of the effect” and “the skill or mental power displayed in the exercise of the bodily act” (Bentham 1952, 260). While bodily labour cannot be appropriated without equivalent effort, skill and knowledge possess a fundamentally different character: they can be imitated, diffused, and appropriated by others at minimal cost.

This asymmetry, Bentham argued, creates a structural problem of incentives. The acquisition of new skill requires prolonged effort, costly experimentation, and exposure to considerable risk, while its benefits may be rapidly dispersed throughout society. Without adequate institutional protection, the inventor has little reason to undertake such investments. It is in this context that Bentham defends the economic legitimacy of patents, which he conceives not as unjust monopolies, but as proportionate and necessary recompenses for the increase in the general stock of wealth generated by invention.

By integrating considerations of innovation, incentive, and institutional design into his economic reasoning, Bentham moves decisively beyond the moral evaluation of usefulness. Although the concept of economic theory remained at this stage fluid and only partially defined, his analysis marks an important moment in the gradual recognition of knowledge and skill as economically relevant resources. In this sense, Bentham contributes to the intellectual conditions that would later allow education, training, and inventive capacity to be interpreted not merely as cultural achievements, but as forms of investment bearing costs, risks, and expected returns.

1.3. The influence of Bacon on Comte and positivism

In the nineteenth century, Francis Bacon’s influence re-emerged in a different form within the positivist tradition. Auguste Comte explicitly identified Bacon as a precursor of positivism, recognising in his work an early attempt to ground knowledge on observation, experimentation, and the systematic organisation of the sciences. In Comte’s reconstruction of the history of human thought, Bacon appears as one of the key figures who contributed to the transition from speculative metaphysics to a scientific mode of inquiry oriented toward practical and social progress.

This acknowledgement is not merely implicit. In *The Positive Philosophy*, Comte explicitly traces the rise of positivist thought back to Bacon, whom he presents as a decisive turning point in the history of modern knowledge. As he writes: “The Positive Philosophy, which has been rising since the time of Bacon, has now secured such a preponderance, that the metaphysicians themselves profess to ground their pretended science on an observation of facts” (Comte 2000, 36).

Viewed in this light, these intellectual developments delineate a broad cultural constellation within which knowledge—particularly scientific and technical knowledge—progressively acquires a productive, instrumental, and socially transformative meaning. From Bacon’s revaluation of useful knowledge, through Enlightenment encyclopaedism and utilitarian moral philosophy, to the positivist ambition to reorganise society on scientific foundations, education increasingly comes to be perceived as a force capable of shaping economic and social outcomes.

This chain of influences extends into the economic thought of the nineteenth century. The economists examined in the following sections become more fully intelligible when situated against the background of this cultural climate, within which education, knowledge, and technical skill had already begun to be understood as central components of social and economic progress.

2. JEAN-BAPTISTE SAY: EDUCATION AS IMMATERIAL WEALTH

Among the major classical economists who addressed the role of education in economic life, Jean-Baptiste Say occupies a remarkable position. Remembered most often as a disciple of Adam Smith—and in particular as the author of what later economists would describe as Say’s Law, often simplified as the idea that supply creates its own demand—Say was also one of the earliest economic thinkers to devote sustained attention to education. In *A Treatise on Political Economy*, first published in French in 1803, Say (1880) repeatedly returns to the role of instruction, training, and knowledge formation in shaping productivity, social stability, and long-term economic development.

Writing at a moment in which mechanisation, specialisation, and the expansion of productive knowledge were profoundly transforming European societies, Say approached education not as a marginal cultural concern, but as a structural component of the economic system itself. His analysis extends well beyond abstract market mechanisms, focusing instead on the concrete effects of machinery, skill formation, and intellectual development on the conditions of labour.

These dimensions of Say’s political economy have attracted sustained attention in the secondary literature, which has examined their implications for theories of economic development and the role of knowledge in modern production (Forget 1999; Steiner 1999; Hollander 2005; Schoorl 2015).

2.1. *On the Baconian legacy of Say's political economy*

It is worth noting that, like Bentham, Say explicitly situates his economic inquiry within the Baconian tradition. At the very beginning of *A Treatise on Political Economy*, he observes that “the inductive method of philosophizing, which, since the time of Bacon, has so much contributed to the advancement of every other science, has been applied to the conduct of our researches in this” (Say 1880, xvii). The empirical orientation that enables Say to recognise these economic truths thus finds its intellectual origin in the *Novum Organon* of Lord Verulam, whose methodological legacy continues to shape the emerging language of political economy.

Within this framework, the French economist develops one of the earliest systematic conceptions of education as an economic resource. Long before the emergence of modern human capital theory, he conceptualised instruction, professional competence, and accumulated expertise as forms of immaterial wealth fully embedded in the processes of production and value creation. Knowledge and skills, although immaterial in nature, generate tangible economic effects, transforming intelligence into a source of productive power.

Say argues that individuals endowed with specific talents cannot be regarded as truly poor, even in the absence of material property. The acquisition of expertise presupposes years of study, sustained effort, and the mobilisation of resources necessary for subsistence, instruction, and training. Education, in this sense, embodies a form of capital invested over time, whose returns materialise through professional activity and the provision of specialised services. As he explicitly states, “whoever has acquired a particular talent ... enjoys an accumulated capital” (Say 1880, xlii).

This reasoning allows Say to integrate education directly into the analytical framework of political economy. Professional services—whether offered by physicians, lawyers, engineers, or civil servants and other public officials—are not exceptional or anomalous forms of production, but constitute fully legitimate expressions of productive activity. They are economic outputs that depend simultaneously on labour and on previously accumulated capital, channelled into long periods of preparation and learning. Even the competencies of civil servants and technical experts, he maintains, must be understood as the outcome of earlier investments whose economic value is confirmed by the persistent demand for such positions.

In advancing this argument, Say explicitly rejects a notion widespread in many economic theories of his time, according to which only labour producing tangible and marketable material goods could be regarded as “productive”. Against this view, he insists that immaterial products—such as services, skills, and professional expertise—constitute genuine forms of wealth. Their economic significance does not depend on physical embodiment, but on their

capacity to satisfy needs, generate income, and contribute to the overall functioning of the productive system, even when the satisfied need is purely psychological, such as pleasure. In his view, describing a musician as “unproductive” not only constitutes an inappropriate stigmatisation of a legitimate profession, but also reflects a poor understanding of the deeper mechanisms of economic life.

From this perspective, education functions as a productive asset capable of yielding returns over time. It is not merely complementary to industrial activity, but constitutive of it. For Say, the income associated with skilled labour reflects not only the effort of current work, but also the remuneration of past investments embodied in the individual. Accordingly, education appears as capital that “ought to yield interest, independent of the ordinary profits of industry” (Say 1880, 327).

2.2. On the necessity of free public education for all

The French economist was fully aware that the advance of industrial production, while dramatically increasing efficiency and output, also generated profound transformations in the experience of work. As the mechanical arts reach higher levels of perfection and labour became increasingly subdivided, “the occupation of the lowest classes of labourers is reduced to one or two operations, for the most part simple in themselves, and continually repeated” (Say 1880, 435).

In such conditions, the worker’s attention and intellectual energy become narrowly focused on a single task, rarely interrupted by novelty or unforeseen situations. Say observed that when the faculties of reflection are seldom exercised, they inevitably deteriorate. The danger of industrial labour, therefore, lies not merely in physical fatigue, but in the gradual degradation of intellectual life. Workers confined to monotonous functions risk losing the capacity to form general ideas, to grasp broader social connections, and to develop elevated moral and civic sentiments.

For Say, this narrowing of perspective carries significant social consequences. Individuals whose intellectual horizon remains restricted to their immediate occupation struggle to perceive the links between their own activity and the wider system of social cooperation. Lacking an understanding of the general relations connecting property, production, and collective prosperity, they may come to interpret social institutions as arbitrary constraints rather than as conditions of common benefit. In this sense, excessive specialisation threatens not only individual development, but also social cohesion.

Yet Say does not respond to this diagnosis by calling into question the organisation of industrial production itself. Unlike later critical traditions,

such as Marxian thought, he does not propose to reduce the division of labour or to transform the relations of production. The economic advantages of specialisation remain, in his view, undeniable. The problem, therefore, must be addressed elsewhere.

The remedy he identifies lies in education. A basic level of instruction—combining reading, writing, arithmetic, and opportunities for reflection—can expand the worker’s intellectual horizon beyond the narrow confines of mechanical labour. Such education enables individuals to situate their own activity within the broader chain of production and to recognise its social significance. As Say maintains, “elevation of mind is generated by enlarged views of men and things” (Say 1880, 435), and without such enlargement genuine civic consciousness cannot arise.

Even elementary instruction, which may appear modest in scope, plays a decisive role in this process. The mere ability to read, he argues, constitutes a gateway to the entire body of knowledge preserved in written form, allowing individuals to access ideas, experiences, and discoveries far beyond the limits of their immediate occupation.

Education thus assumes a compensatory function within the industrial order. It does not abolish specialisation, but mitigates its intellectual and moral consequences. By preserving a minimal capacity for abstraction and general understanding, instruction allows industrial society to benefit from mechanisation without entirely sacrificing the cognitive and civic development of those who labour within it.

Having identified the intellectual impoverishment generated by extreme specialisation, Say turns to the question of responsibility. If industrial society requires a minimum level of knowledge and intelligence among the labouring classes in order to function cohesively, who is to provide it?

His answer is unambiguous. The individual worker, placed within the vast machinery of national production, is generally able to earn little more than a bare subsistence. Under such conditions, it is unrealistic to expect families to finance the education that the well-being of society itself requires. The reproduction of intelligence, competence, and civic understanding cannot be left to private means alone.

For the French economist, this creates a clear case for collective intervention. Say is explicit on this point: “if the community wish to have the benefit of more knowledge and intelligence in the labouring classes, it must dispense it at the public charge” (Say 1880, 435).

The form of education he envisages is neither elitist nor encyclopaedic. Say advocates the establishment of primary schools providing instruction in reading, writing, and arithmetic—the foundational skills upon which all further knowledge depends. These elementary competencies are sufficient, in his view, to secure the civilisation of the lower classes and to prevent large seg-

ments of the population from remaining excluded from social life. Without such instruction, he argues, a nation cannot truly be regarded as civilised, regardless of its material prosperity.

At the same time, Say insists that elementary education performs an essential function of social mobility. By widening access to learning, even at a basic level, education creates the conditions under which latent talents may emerge and superior abilities can be identified and cultivated for the benefit of the community. In this sense, education operates not only as a mechanism of social integration, but also as a selective channel through which individual capacities are recognised and developed.

Notably, the French economist extends this argument to women, maintaining that the public has an equal interest in their education. As the first educators of future generations, women play a decisive role in the transmission of knowledge and values, making their instruction a matter not of private preference but of collective concern.

In this framework, education appears not as a charitable concession, but as a strategic investment in the intellectual infrastructure of society. Public instruction becomes a necessary complement to industrial development, ensuring that economic progress does not proceed at the cost of widespread ignorance and social fragmentation.

3. JOHN STUART MILL: BETWEEN PRODUCTIVITY AND HUMAN DEVELOPMENT

In selecting a second turning point in the intellectual trajectory through which education gradually entered economic reasoning, the choice can hardly fall elsewhere than on John Stuart Mill. Beyond having produced some of the most influential works in political economy (Mill 2009), he articulated a remarkably sophisticated and forward-looking reflection on education, one that profoundly reshaped the relationship between economic development, individual formation, and social progress. The richness of his thought and the impact of his civic and political engagement have been examined in considerable detail by a vast critical literature (Berlin 1969; Ten 1980; Skorupski 1989; Brink 2013).

Mill occupies a distinctive position in the intellectual landscape of the nineteenth century, not only as a leading figure of classical political economy, but also as a central mediator between several major currents of modern thought. He stands at the intersection of the Baconian legacy, utilitarian moral philosophy, and the emerging positivist tradition, contributing decisively to their transmission, reformulation, and critical integration within economic reasoning.

Mill's intellectual formation is deeply marked by utilitarianism. In his *Principles of Political Economy*, he explicitly acknowledges the centrality of Jeremy Bentham, whom he describes as “the most influential and, on the whole, most eminent philosophical writer of recent times” (Mill 2004, 159). Yet Mill's relationship with Bentham is not one of uncritical adherence. While inheriting the utilitarian emphasis on consequences and social usefulness, he progressively distances himself from Bentham's more mechanistic and reductionist tendencies, seeking to reintroduce qualitative distinctions into the evaluation of human development.

At the same time, Mill plays a crucial role in the dissemination of positivist ideas in the English-speaking world. As editor of Auguste Comte's works and one of the principal promoters of positivism in Britain, he contributes to extending the scientific ideal of social inquiry beyond the confines of philosophy, reinforcing the ambition to subject moral, social, and economic phenomena to systematic analysis. Still, he consistently resisted the more rigid and system-building tendencies of positivism, defending the openness and fallibility of scientific inquiry against the claims of comprehensive and dogmatic social systems.

Mill's engagement with the Baconian tradition is equally revealing. In his *Inaugural Address at the University of St Andrews*, which we shall examine in greater detail later, he explicitly recognises Francis Bacon's historical merit in identifying the necessity of methodological rules for scientific inquiry, while at the same time criticising the limitations of Bacon's conception of induction. As Mill observes, Bacon's approach reflected “the earliest stage of the inductive sciences” and failed to fully acknowledge the indispensable role of deductive logic and mathematics in scientific progress (Mill 1867, 240). This critical stance exemplifies Mill's broader intellectual posture: one that honours the founders of modern scientific thought while insisting on the need to refine and correct their methodological assumptions.

Mill also engages with the work of Jean-Baptiste Say on several of the issues discussed above, including the economic significance of education and the status of immaterial forms of labour. This implicit dialogue situates Mill's educational reflections within the core debates of classical political economy.

3.1. On productive and unproductive labour in Mill's political economy

Our analysis of Mill's position on education begins with *Principles of Political Economy* (1848), the work through which he most clearly positioned himself within the central controversies of economic theory. In this treatise, he discusses at length the contributions of the major economists of his time—most notably Adam Smith, David Ricardo, and Jeremy Bentham—while only

rarely referring explicitly to Jean-Baptiste Say. Yet when Say does appear, it is precisely in relation to a question that lies at the heart of the present analysis: whether education should be regarded as a productive activity, and therefore as an integral component of economic theory, or relegated to the domain of non-productive labour.

Mill's discussion unfolds within a broader controversy among political economists concerning the distinction between productive and unproductive labour. He observes that much of this debate rests not on substantive disagreement, but on divergent uses of language. Some authors restrict the notion of productive labour to activities yielding tangible, transferable material goods. Others—among whom Mill explicitly includes Say—reject this restriction, objecting that the label “unproductive” carries a pejorative connotation and unjustly devalues socially useful forms of work.

Mill clarifies that the disagreement is largely nominal. The issue, he argues, does not concern the usefulness or moral worth of different kinds of labour, but the analytical meaning attached to the concept of production. In common economic usage, productive labour refers not to the creation of utility in general, but to the production of wealth—understood primarily as material wealth. From this standpoint, the distinction serves classificatory rather than evaluative purposes.

Within this framework, Mill devotes explicit attention to the economic status of education across two consecutive chapters of *Principles of Political Economy*. In the first, significantly entitled “Of Labour as an Agent of Production”, he includes education unambiguously among the productive forms of labour. Rejecting any narrow identification of production with immediate material output, Mill argues that the formation of skills and competences constitutes an essential component of the productive process itself. As he writes:

the technical or industrial education of the community; the labour employed in learning and in teaching the arts of production, in acquiring and communicating skill in those arts; this labour is really, and in general solely, undergone for the sake of the greater or more valuable produce thereby attained, and in order that a remuneration, equivalent or more than equivalent, may be reaped by the learner, besides an adequate remuneration for the labour of the teacher, when a teacher has been employed. (Mill 2004, 26)

Education is thus conceptualised not as a cultural accessory, but as labour undertaken with a clearly economic rationale: the enhancement of productive capacity and the generation of future output. The time and effort devoted to learning are interpreted as part of the social cost of production, insofar as they contribute directly to the creation of goods and wealth.

Mill extends this reasoning further by treating the maintenance of productive powers as itself a productive activity. Just as labour invested in acquiring skills forms part of the productive process, so too does labour devoted to preserving those capacities from deterioration. Activities aimed at preventing the destruction or weakening of human productive powers—whether through accident, illness, or physical decline—must therefore be understood as economically necessary. In this sense, even the work of physicians and surgeons, when directed toward individuals engaged in industry, represents a social sacrifice incurred to safeguard that portion of productive resources embodied in the physical and mental capacities of workers.

The author of the *Principles* returns to the issue in the subsequent chapter, “Of Unproductive Labour”, where he confronts directly the longstanding controversy among political economists concerning the meaning of productivity. It is here that he explicitly engages with Jean-Baptiste Say, clarifying that much of their apparent disagreement arises not from divergent assessments of education or knowledge, but from different classificatory uses of the term “productive”. In that chapter, he develops a tripartite typology of labour. First, there is labour that produces utilities embodied in external material objects. Second, there is labour that produces utilities embodied in human beings themselves. This category includes, most notably,

the labour of all concerned in education: not only schoolmasters, tutors, and professors, but governments, so far as they aim successfully at the improvement of the people; moralists, and clergymen, as far as productive of benefit; the labour of physicians, as far as instrumental in preserving life and physical or mental efficiency; of the teachers of bodily exercises, and of the various trades, sciences, and arts, together with the labour of the learners in acquiring them; and all labour bestowed by any persons, throughout life, in improving the knowledge or cultivating the bodily or mental faculties of themselves or others. (Mill 2004, 29)

Third, Mill identifies forms of labour that yield utilities not embodied in any lasting object or capacity, but consisting in services or pleasures that exist only while they are being performed. Musical performance, theatrical acting, and similar activities fall within this category. These forms of labour may be valuable or enjoyable, yet they do not generate accumulable wealth and therefore may be labelled “unproductive”, provided that the term is understood as analytically descriptive rather than as carrying negative connotations.

From this analytical distinction follows Mill’s partial disagreement with Say. While fully endorsing the view that education, knowledge, and skill formation constitute genuine productive forces, he resists extending the concept of productive labour to all activities that merely generate pleasure or momentary satisfaction. Utilities that leave no permanent acquisition—whether in

material goods or in durable human capacities—cannot, in his view, be considered productive in an economic sense, even if they fulfil psychological needs such as enjoyment or emotional gratification.

Nevertheless, Mill explicitly affirms that labour devoted to education and training must be classified as productive whenever it contributes, directly or indirectly, to an increase in material output. The acquisition of skills, the diffusion of technical knowledge, and the formation of industrial competence all enhance the productive powers of society. In this sense, education becomes a central component of economic accumulation, not despite its immaterial character, but precisely because it strengthens the capacities through which material wealth is generated.

3.2. On liberty and the quality of public education

Much like Say, Mill supports the principle of compulsory elementary education for all citizens, financed at public expense. In both cases, education is conceived as a collective necessity rather than a private luxury, and as a precondition for the proper functioning of an industrial society. Yet Mill's educational model displays a number of distinctive features that emerge most clearly in his writings on educational reform, in particular in *Reform in Education* (Mill 1996, 63–74).

At the time Mill was writing, a system of popular instruction already existed in Britain. Schools were widespread, substantial financial resources were available, and large sums were raised both through parliamentary grants and private contributions. From a purely quantitative perspective, education appeared to be adequately provided. Mill, however, regarded this situation as deeply unsatisfactory. The central problem, in his view, was not the absence of schools, but the poor quality of the instruction they delivered.

As he repeatedly emphasises, the mere existence of educational institutions does not guarantee education in any meaningful sense. A system may offer schooling in abundance while failing entirely in its formative function. In this respect, Mill draws a sharp distinction between the quantity of teaching and its quality, insisting that it is precisely the latter that “so grievously demands the amending hand of government” (Mill 1996, 64). Instruction, he argues, had too often degenerated into mechanical routine: children were trained to repeat words by rote, without attaching clear ideas to them, and without developing intellectual habits capable of guiding conduct or judgement.

This deficiency was not confined to marginal institutions. Even forms of schooling explicitly designed for moral development—such as infant schools—were, in Mill's view, subject to a process of profound distortion. Institutions originally intended to cultivate dispositions, character, and the

capacity to live socially had been transformed into spaces of empty verbalism and meaningless repetition. What should have been an education for life had become, instead, an early introduction to intellectual passivity.

Mill's critique thus targets neither the principle of public education nor its diffusion across society, but the absence of any effective mechanism for ensuring educational substance. Left entirely to private initiative, charitable impulses, or sectarian interests, instruction risks becoming fragmented, doctrinaire, or intellectually barren. At the same time, the liberal thinker remains deeply suspicious of a centralised state system imposing uniform doctrines, curricula, or moral outlooks upon the population. A national education administered directly by the state, he warns, would place in the hands of government a dangerous power over opinion, belief, and character.

In *On Liberty*, after describing the failure to provide education to one's children as "a moral crime", Mill clarifies his position in the following terms:

If the government would make up its mind to *require* for every child a good education, it might save itself the trouble of *providing* one. It might leave to parents to obtain the education where and how they pleased, and content itself with helping to pay the school fees of the poorer classes of children, and defraying the entire school expenses of those who have no one else to pay for them. (Mill 1859, 158)

In other words, his proposed solution seeks to avoid both extremes. On the one hand, education cannot be left to educational anarchy, in which schools exist in name only and quality varies arbitrarily. On the other hand, it must not become a state monopoly. Mill therefore articulates a model based on a strict institutional separation between public responsibility and pedagogical control. The state has the right—and the duty—to ensure that every child receives an adequate education, and to verify that instruction meets certain minimal standards of quality. It may inspect, evaluate, and certify outcomes. What it must not do is dictate what citizens are to believe, nor impose uniform methods of teaching.

In this framework, diversity of schools, plurality of approaches, and competition among educational institutions are not defects but safeguards of intellectual freedom. Education is publicly financed and socially guaranteed, yet privately delivered and pedagogically plural. Government intervenes not as teacher, but as guarantor: not to shape minds, but to prevent minds from remaining unformed.

A comparable logic can be found in Say's reflections on professional and higher education. While recognising the right of society to regulate activities whose improper exercise might harm the community, Say insists that such regulation should be confined to the verification of competence. In the case of

physicians and other medical professionals, whose decisions directly affect human life, public examinations are justified as a means of certifying qualification. Yet he explicitly rejects both numerical restrictions on practitioners and state interference in the organisation of their education. Society, he argues, has no legitimate interest beyond ascertaining professional capability; how education is structured, and by whom it is provided, should remain open and pluralistic (Say 2008, 181).

In both thinkers, therefore, education emerges as a public concern without becoming a state monopoly. Public authority is invoked to guarantee access and competence, but not to impose intellectual uniformity. This shared position reflects a liberal attempt to reconcile collective responsibility with individual freedom, and to prevent education from becoming either a purely private privilege or an instrument of centralized social control.

3.3. Mill's critique of specialisation in higher education

At this point, the analysis must turn to Mill's position on higher education. If Mill stands in broad agreement with Say on the general value of education, on the necessity of universal elementary instruction, on the social usefulness of scientific and technical knowledge, on the benefits of market mechanisms, and on the legitimacy of a supervisory role for the state, his stance diverges sharply from those who—while sharing some of these premises—embraced an excessively radical interpretation of productive utilitarianism.

As the process of industrialisation intensified, a growing reformist movement advocated a more decisive reorientation of education away from classical studies and toward technical and scientific subjects. In its most programmatic formulations, this movement did not merely propose the integration of scientific instruction into existing curricula, but its outright substitution for the traditional classical canon, together with a stronger push toward early intellectual specialisation.

It is within this contested intellectual landscape that Mill's position on higher education must be situated. Far from representing a conservative defence of inherited educational models, he intervened in the debate as a liberal reformer deeply committed to social progress. His resistance was directed not against science or technical knowledge as such, but against an educational model that threatened to fragment intellectual formation and to reduce learning to narrowly instrumental ends.

The solution he advanced was therefore not a return to education *sic et simpliciter* as it had existed in the past, but an expansion of liberal education through the systematic inclusion of scientific studies—conceived not as substitutes for classical learning, but as its necessary complement.

Indeed, Mill may be regarded as a genuinely polymathic thinker, whose intellectual activity extended across several domains, including political economy, logic, moral philosophy, political theory, and educational reflection. This breadth was not accidental, but constitutive of his intellectual identity. It enabled him to perceive, at an early stage, the tensions introduced by industrialisation between economic efficiency and the integrity of human development.

This disposition is clearly reflected in the educational model he advocated. Education, in Mill's view, should not merely serve the immediate requirements of industrial productivity, nor be confined to the transmission of specialised competencies. Rather, it should aim at the formation of versatile and reflective individuals—capable of orienting themselves within the emerging industrial order without becoming intellectually fragmented by it.

This intellectual orientation finds one of its clearest and most systematic expressions in Mill's *Inaugural Address at the University of St Andrews* (1867). In that text, written explicitly for an academic audience, Mill responds—without naming them directly—to the more radical educational reformers of his time, and articulates a comprehensive reflection on the proper function of higher education in modern society.

He begins by drawing a sharp distinction between education properly understood and professional training. Universities, he argues, are not institutions designed to prepare individuals for specific occupations, but rather to form “capable and cultivated human beings” (Mill 1996, 218). Professional schools—of law, medicine, engineering, and the industrial arts—are both legitimate and socially valuable, yet they do not constitute the core task that one generation owes to the next, namely the preservation of the intellectual and moral foundations upon which civilisation itself depends. As Mill famously observes, “men are men before they are lawyers, or physicians, or merchants, or manufacturers” (Mill 1867, 218).

This anthropological priority structures Mill's entire conception of education. At a time when industrial society was already exerting pressure toward functional differentiation and vocational efficiency, he resisted the reduction of learning to professional utility. Education, in his view, must precede specialisation, not follow from it. Its primary aim is not the production of technical competence, but the formation of judgement, character, and intellectual autonomy.

A central theme of the *Inaugural Address* is the contemporary controversy between literary and scientific education. Educational reformers, Mill notes, increasingly framed the issue as an either–or choice between the classical languages and the modern sciences. Against this polarisation, he advances a position that is both simple and far-reaching. “Why not both?” he asks, adding: “Can anything deserve the name of a good education which does not include

literature and science too?" (Mill 1867, 221). To exclude either dimension would be to produce individuals who are, in his words, "a poor, maimed, lopsided fragment of humanity" (Mill 1867, 221).

Mill's defence of intellectual breadth does not stem from nostalgia for classical learning, nor from hostility toward scientific progress. On the contrary, he explicitly acknowledges the indispensable role of scientific instruction in a world governed by natural laws that human beings did not create. Scientific education provides not only information, but also models of rigorous reasoning and disciplined inquiry, just as classical literature offers unsurpassed standards of expression and interpretive sensitivity (Mill 1867, 233–235). The two traditions, far from being incompatible, cultivate complementary intellectual faculties.

At the same time, Mill demonstrates acute awareness of the structural forces driving specialisation. The rapid accumulation of knowledge, he observes, burdens every field with such an abundance of detail that those who seek precision are compelled to confine themselves to ever narrower domains. If such confinement were to entail ignorance of everything beyond one's own speciality, Mill warns, the result would be intellectual degradation rather than progress. In a striking passage, he asks what the worth of a human being would become if his knowledge were limited to "his own infinitesimal fraction of human wants and requirements", concluding that such a condition "will be even worse than that of simple ignorance" (Mill 1867, 223).

The danger, for Mill, lies not in specialisation as such, but in exclusive specialisation. Experience, he writes, shows that no study "practised to the exclusion of all others, does not narrow and pervert the mind", breeding both discipline-specific prejudices and a general incapacity for large views (Mill 1867, 223). Against this risk, Mill proposes an educational ideal based on combination rather than opposition: a general knowledge of many subjects, understood not as superficial acquaintance but as grasp of their fundamental principles, combined with thorough mastery of one or a few domains. Only such a synthesis, he argues, can sustain an enlightened public capable of recognising genuine expertise without surrendering intellectual autonomy.

Under this conception, Mill assigns particular importance to the study of the classics as a formative starting point of liberal education. The dialectical traditions of ancient philosophy, especially those exemplified by Plato and Aristotle, provided, in his view, unsurpassed instruments for the stimulation and discipline of the inquiring intellect (Mill 1867, 229). Yet this classical foundation does not preclude engagement with modern knowledge. On the contrary, it prepares the mind to approach scientific and social inquiry with conceptual clarity and critical judgement.

This integrated conception of education also informs Mill's attitude toward political economy itself. Far from regarding economic reasoning as mo-

rally corrosive, he explicitly encouraged students to engage with it seriously, advising them to “study the great writers on Political Economy, and hold firmly by whatever in them you find true”, while reassuring them that, if they were not already selfish or hard-hearted, “Political Economy will not make you so” (Mill 1867, 245). Economic knowledge, when embedded within a broader intellectual formation, could thus contribute to social understanding rather than ethical impoverishment.

Taken as a whole, Mill’s educational thought represents one of the most articulate attempts to preserve a humanistic ideal of intellectual unity at the threshold of modern industrial society. Writing at a time when systematic specialisation had not yet become the dominant principle of social organisation, he sought to reconcile economic progress with the cultivation of reflective, versatile, and morally responsible individuals. In this sense, Mill’s position marks a transitional moment in the history of economic thought: a final effort to integrate education within a broader conception of human development, before analytical attention would increasingly shift toward productivity, efficiency, and measurable returns.

In the decades that followed, profound technological and industrial transformations progressively reshaped the conditions under which education could be theorised. The expansion of scientific and technical knowledge, together with the growing differentiation of economic functions, reinforced the division of labour and encouraged an increasingly instrumental conception of education, understood less as a unified process of human formation and more as a differentiated set of competencies aligned with specific productive roles.

During the mid-twentieth century, these changes found their first systematic expression in economic analysis. Authors such as Fritz Machlup (1962) began to conceptualise education as an identifiable component of the economic system, subject to measurement, classification, and statistical analysis. Related contributions, notably those of Theodore Schultz (1961), further prepared the ground for a reconceptualisation of education in explicitly investment-oriented terms. These developments did not yet constitute a full theory of human capital, but they established the analytical conditions under which such a theory would become possible.

4. GARY BECKER: EDUCATION AS A FORMAL ECONOMIC VARIABLE

With Gary S. Becker, the long transformation of education into an economic variable reaches its most systematic formulation. Whereas Jean-Baptiste Say had first introduced education into economic reasoning as a factor contributing to productive capacity, and John Stuart Mill had subsequently sought to integrate it within a broader conception of human development and social pro-

gress, Becker reconceptualises education as a form of investment whose returns can be analysed in terms of productivity, adaptability, and economic growth. Education is no longer approached as a complementary condition of economic life, but as a central object of economic calculation.

Gary S. Becker, University Professor of Economics and Sociology at the University of Chicago, was awarded the Nobel Prize in Economic Sciences in 1992, and his influence on modern economic thought is difficult to overestimate. His most widely known work, *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, originally published in 1964 and subsequently revised and expanded in later editions, most notably in 1993, has been cited in more than seventy thousand scholarly publications. Given the scale and diversity of this literature, a comprehensive review lies well beyond the scope of the present article. The discussion therefore confines itself to highlighting a limited number of insights that are particularly useful for framing the argument developed here.

From a methodological perspective, Hurtado (2005) traces the philosophical foundations of Becker's economic approach to a Benthamite utilitarian framework, emphasising the primacy of rational choice as a general explanatory principle for social behaviour. A more explicitly theoretical critique is developed by Aranzadi del Cerro (2006), who questions the anthropological assumptions underlying Becker's generalisation of the maximising agent and highlights the tension between methodological individualism and broader conceptions of human agency. Complementing these perspectives, historical reconstructions have focused on the formative context of Becker's early work. Teixeira (2014) shows how human capital theory emerged through specific collaborations and intellectual exchanges, underscoring both its continuity with earlier economic debates and the distinctiveness of Becker's analytical move. Finally, Weiss (2015) clarifies the theoretical originality of Becker's contribution by distinguishing it from contemporaneous empirical approaches, arguing that its novelty lay not primarily in improved measurement, but in the construction of an integrated framework linking education, earnings, and individual life-cycle decisions.

4.1. Mill's legacy in Gary Becker's thought

Building on the distinction between continuity with earlier traditions and innovation with respect to them, it is instructive to consider how Becker himself situates his own research.

In chapter 3 of *Human Capital*, Becker explicitly acknowledges that "important and pioneering work had been done on the economic return to various occupations and education classes". In a detailed footnote, he provides an ex-

tensive list of predecessors. He begins by referring to classical and neoclassical economists—notably Adam Smith, John Stuart Mill, and Alfred Marshall—thereby placing his work within a long-standing tradition of reflection on education, skills, and earnings. He then cites a series of more recent contributions published between 1945 and 1961, including Milton Friedman and Simon Kuznets (1945), Harold Clark (1937), James R. Walsh (1935), George Stigler and David Blank (1957), and Theodore W. Schultz (1961).

Among these authors, Becker attributes particular importance to Schultz. This assessment is made explicit in the Preface to *Human Capital*, where Becker (1993, xxii) recognises Schultz as “the major figure in the economics of education”. Still, at the same time, he clearly presents his own contribution as going beyond a simple extension or reformulation of earlier studies. As he explains:

It soon became clear to me, however, that more than a restatement was called for; there had been few, if any, attempts to treat the process of investing in people from a general viewpoint or to work out a broad set of empirical implications. I began then to prepare a general analysis of investment in human capital. (Becker 1993, 29)

While Becker thus strongly emphasises the originality of his analytical project, his explicit reference to continuity with earlier authors remains significant. In this respect, the link he establishes with Mill appears particularly noteworthy.

The fact that this continuity is not merely rhetorical is confirmed by the recurrence of Mill’s ideas in other parts of Becker’s analysis. Mill is explicitly invoked when Becker discusses the unequal international distribution of returns to education and other forms of human capital. Becker argues that the rates of return on education and human capital tend to be higher in developed than in underdeveloped countries, both in absolute terms and relative to returns on physical capital. This asymmetry helps to account for persistent patterns of skilled migration from poorer to richer economies—the so-called “brain drain”—as well as for the concentration of research and development activities in advanced countries. As human capital accumulates with economic development, investments in education-intensive innovation expand, reinforcing cumulative processes of technological leadership.

It is in this context that Becker explicitly calls upon Mill. Reflecting on the dynamics of post-crisis recovery, Becker (1993, 346) notes that “it has been known for a long time that recovery from wars and other disasters is usually remarkably rapid”. He then recalls Mill’s qualification, according to which recovery occurs swiftly only when the population is left “with the same

skill and knowledge which they had before” (Mill 1848, 75). Building on this insight, Becker argues that while modest losses of knowledge and skills may be reversible, sufficiently large reductions in human capital can trigger cumulative decline, as both physical and human capital deteriorate simultaneously. Through this example, Becker illustrates the strategic importance of human capital when compared with physical capital, and clarifies why long-term economic resilience depends less on the mere restoration of material assets than on the preservation of knowledge and skills.

4.2. *A dynamic model of fertility and human capital accumulation*

To pursue this argument further, it is important to note that these ideas are subsequently formalised within a fully articulated theoretical model. The discussion presented above corresponds to the *Discussion* section of a paper co-authored by Gary S. Becker, Kevin M. Murphy, and Robert Tamura, entitled “Human Capital, Fertility, and Economic Growth”. Originally published in the *Journal of Political Economy* in 1990, the paper was later included as Chapter XII of the third edition of *Human Capital* (1993).

The article develops a model of economic growth in which fertility behaviour and investment in education are treated as endogenous variables. The authors assume that the rate of return on human capital is not constant, but increases as the overall stock of human capital expands. When levels of education and knowledge are high, returns on investment in human capital tend to exceed the returns associated with child quantity. Conversely, when human capital is scarce, investing in education yields relatively low returns, while fertility becomes economically more attractive.

On this basis, the model predicts systematic differences in demographic and educational choices across societies. Economies characterised by limited stocks of human capital tend to favour large families and low investment per child, whereas societies endowed with abundant human capital tend to adopt lower fertility rates combined with higher educational investment. These contrasting choices generate divergent long-term trajectories, leading to the emergence of two distinct and stable steady states: one associated with high fertility and low human capital accumulation, and another characterised by smaller families and the possibility of sustained growth in both human and physical capital.

Beyond these core mechanisms, the paper extends the analysis to the international distribution of human capital. Differences in rates of return on education contribute to persistent patterns of skilled migration from poorer to richer economies—the so-called “brain drain”—as well as to the geographical concentration of research and development activities in advanced countries.

As human capital accumulates with economic development, education-intensive innovation expands, reinforcing cumulative processes of technological leadership.

In this work, the authors proceed to develop a formal dynamic model in which the accumulation of knowledge and education is explicitly incorporated into a growth framework. Human capital is treated as a state variable whose evolution depends on both investment decisions and demographic behaviour. A central assumption of the model concerns intergenerational preferences, drawn from Becker's earlier work with Robert Barro (1985) on dynastic families. Parental utility is defined as:

$$V_t = u(c_t) + a(n_t)n_t V_{t+1}$$

where c_t denotes parental consumption, n_t the number of children, and V_{t+1} the utility of each child. The altruism parameter $a(n)$ is assumed to decline with fertility, reflecting diminishing marginal concern for each child as family size increases.

This structure generates a direct link between fertility, discounting of the future, and investment in education. When human capital is low, fertility tends to be high, the discount rate on future consumption is correspondingly elevated, and the return to educational investment remains limited. Formally, at very low levels of human capital, the discount rate exceeds the rate of return on investment in human capital:

$$[a(n_t)]^{-1} > Rh \text{ when } H = 0$$

Under these conditions, the economy has no incentive to invest in education, and a low-human-capital steady state emerges. As human capital increases, however, the rate of return on educational investment rises, while fertility declines and intergenerational discounting weakens. Eventually, a second equilibrium becomes possible, characterised by the condition:

$$[a(n^*)]^{-1} = Rh(H^*)$$

where H^* denotes the steady-state level of human capital and n^* the corresponding fertility rate.

The model thus admits multiple development paths. Societies with sufficiently low initial stocks of human capital may converge toward stagnation, while those above a critical threshold enter a cumulative process of educational expansion and sustained growth. In this framework, knowledge and education are no longer auxiliary determinants of economic performance, but endogenous variables governing the long-term dynamics of development.

4.3. *Specialisation as a consequence of knowledge growth*

Since Mill explicitly raised the issue of specialisation—while also drawing attention to its potential negative implications—it is instructive to examine how Becker approaches the same problem.

He does so in a paper written in collaboration with Kevin M. Murphy, entitled “The Division of Labor, Coordination Costs, and Knowledge”. Originally published in the *Quarterly Journal of Economics* in 1992 and included one year later as Chapter XI of the third edition of *Human Capital*, the article develops a theoretical account of the relationship between knowledge accumulation, coordination costs, and the deepening of economic specialisation.

Building on the classical insight that productivity increases when workers concentrate on a narrower range of tasks, Becker and Murphy argue that the extent of specialisation cannot be explained solely by market size or by the traditional limits emphasised in earlier economic theory. Instead, they propose that the degree of specialisation is shaped by a broader set of structural factors, most notably the costs associated with coordinating specialised workers engaged in complementary tasks and the overall stock of general knowledge available within the economy. In this view, the division of labour emerges not merely as a function of exchange opportunities, but as the outcome of an interaction between knowledge accumulation and organisational constraints.

At the outset of his analysis, Becker draws attention to a long-term trend toward increasing specialisation in modern societies. What is at stake is no longer the differentiation between broad disciplines, but a progressive fragmentation within disciplines themselves. The contemporary division of labour increasingly operates at the level of subdisciplines, producing forms of expertise that are ever more narrow and technically refined. As a result, modern education appears increasingly distant from the polymathic ideal defended by authors such as Mill.

To illustrate the magnitude of this transformation, Becker refers to developments in several professional domains. In medicine, for example, specialisation was relatively limited in the nineteenth century, when the vast majority of physicians operated as general practitioners. By contrast, in the late twentieth century specialised practice had become the dominant model, as “probably no more than 15 percent of physicians in the nineteenth century were specialists—neither general practitioners nor pediatricians—while in recent years over 75 percent of United States physicians specialize” (Becker 1993, 307).

A similar pattern can be observed in the evolution of economics as an academic discipline. In its early institutional phase, economic research was organised around general-purpose journals. As Becker notes, “the first three economic journals started in the United States were general purpose journals—

the *Quarterly Journal of Economics* in 1886, the *Journal of Political Economy* in 1892, and the *American Economic Review* in 1911—whereas most of the many journals established in recent years are highly specialized: the *Journal of Applied Econometrics*, the *Journal of Legal Studies*, and the *Journal of Economic Demography* are a few examples” (Becker 1993, 307). The proliferation of specialised outlets reflects the increasing subdivision of knowledge within the discipline itself.

Engineering provides a further illustration of the same historical process. Engineers in the early nineteenth century were not highly specialised, but the expansion of industries based on new technologies and the growing scientific foundations of production progressively generated a multiplicity of specialised fields. Over time, distinct professional societies emerged, from civil engineering in 1818 to mechanical engineering in 1847, electrical engineering in 1871, automobile engineering in 1906, followed by chemical and other specialised branches throughout the twentieth century.

Taken together, these examples support Becker’s central diagnosis: “the engineering, medical, and economics examples illustrate that much of the growth in specialization over time has been due to an extraordinary growth in knowledge” (Becker 1993, 307). In Becker’s framework, therefore, the progressive fragmentation of expertise is not a pathological deviation, but the predictable consequence of cumulative scientific and technological development.

Becker formalises the relationship between education, technological knowledge, and specialisation through a simple analytical model. The central assumption of the model is that general knowledge and task-specific skills are typically complementary rather than substitutable. As the stock of human capital increases, investments in specialised competencies tend to become more productive, thereby reinforcing the division of labour.

This relationship is expressed by the condition:

$$\frac{\partial}{\partial H} \left(\frac{\partial B}{\partial n} \right) = B_{nh} > 0$$

This equation indicates that an increase in general human capital (H) raises the marginal productivity of task-specific knowledge (n). In other words, higher levels of general education make specialised training more valuable, not less. From Becker’s perspective, education therefore does not counteract specialisation, but actively promotes it.

Starting from this condition, Becker derives the implications for the organisation of work by differentiating the first-order condition that maximises income per worker with respect to human capital. This yields:

$$\frac{dn^*}{dH} = \frac{B_{nh}}{(C_{nn} - B_{nn})} > 0$$

where the second-order condition satisfies:

$$B_{nn} - C_{nn} < 0$$

This equation shows that, as human capital and technological knowledge expand, the optimal degree of specialisation increases. Rather than encouraging more generalist forms of labour, economic development tends to reinforce increasingly fine-grained divisions of productive activity.

Becker explicitly contrasts this result with the classical formulation found in Adam Smith. While Smith had argued that the division of labour itself generates greater knowledge and productivity, Becker reverses the causal chain, emphasising how the expansion of general knowledge contributes to a deeper division of labour and to the growth of task-specific expertise. As he writes, “teams get larger and workers become more specialized and expert over a smaller range of skills as human capital and technological knowledge grow” (Becker 1993, 307).

This reversal of the causal chain has direct implications for the role assigned to education within Becker’s framework. General education, in this perspective, does not primarily serve to broaden the range of activities individuals perform. Instead, it enhances their capacity to operate effectively within highly complex productive systems. By providing cognitive foundations—such as analytical reasoning, abstract thinking, and basic scientific understanding—general knowledge raises the productivity of narrowly defined, task-specific skills.

From this standpoint, retraining and continuous skill acquisition are not temporary responses to technological disruption. They constitute a permanent structural feature of advanced economies. As technological change accelerates, the economic lifespan of skills shortens, requiring workers to update their competencies repeatedly over the course of their careers. Education thus becomes an ongoing process aimed at sustaining productivity under conditions of continual technological transformation, rather than a means of cultivating broadly rounded individuals.

These theoretical perspectives were not confined to academic debate, but were progressively incorporated into the policy frameworks of many countries and international organisations. Most notably, the OECD played a central role in translating the logic of human capital theory into concrete educational strategies. From the 1990s onward, it promoted the concept of lifelong learning as a systematic response to technological change, demographic ageing,

and increasing labour market volatility, most explicitly in the influential report *Lifelong Learning for All* (OECD 1996).

Within this policy paradigm, education was increasingly framed as an investment in human capital and as a key instrument for sustaining productivity, employability, and international competitiveness in a globalised economy. Learning was no longer conceived as a phase confined to early life, but as a continuous process extending across the entire life course, closely aligned with the evolving demands of technological innovation.

While these policy-oriented approaches often employed a more instrumental vocabulary than critical social theory, they nonetheless reflected a shared diagnosis. In an era characterised by rapid technological transformation, the capacity for continuous learning came to be regarded as a decisive economic and social resource rather than as a purely individual attribute.

CONCLUSIONS

This article has traced the long conceptual trajectory through which education gradually came to be treated as a variable within economic thought. Far from emerging abruptly in the twentieth century, this transformation developed through a sequence of intellectual reconfigurations spanning more than two centuries in the history of economic theory, and considerably longer if its deeper epistemological roots are taken into account.

The process begins with Francis Bacon, who conferred epistemic legitimacy upon useful knowledge, experimental science, and the mechanical arts. By redefining knowledge as a practical instrument for the improvement of human life, Bacon exerted a lasting influence on European intellectual culture, particularly on Enlightenment thought and later positivist traditions. Jeremy Bentham further advanced this orientation by embedding knowledge within a utilitarian framework, extending economic reasoning to domains such as innovation and the patent system, where applicable knowledge acquired direct economic relevance.

A decisive step was taken by Jean-Baptiste Say, who recognised knowledge as a fundamental immaterial product of industrial society—an invisible form of capital essential to economic development. John Stuart Mill deepened this insight by situating education within a broader reflection on social progress, individuality, and long-term development. While advocating universal access to education financed by the state, Mill simultaneously insisted on educational quality and expressed concern about the potentially corrosive effects of excessive specialisation, particularly in higher education.

With Gary S. Becker, this historical trajectory reaches its most systematic formulation. Education is reconceptualised as a form of capital embodied

in individuals and subject to investment, depreciation, and return. Knowledge and skills are no longer treated as background conditions of economic life, but as variables integrated into formal economic theory. In this framework, education becomes a central mechanism through which modern economies respond to technological change, shifting skill requirements, and the continuous reorganisation of labour.

Becker developed these reflections at a historical moment in which the acceleration of technological change had become a structural feature of advanced economies. Automation no longer appeared as a distant possibility, but as an ongoing process reshaping labour markets and shortening the economic life-cycle of competencies. The central educational problem was therefore no longer how to preserve a humanistic ideal of formation, but how individuals and societies could continuously adapt to evolving technological demands.

From this standpoint, education is interpreted primarily through the lens of economic rationality. Individuals invest in schooling and training in order to enhance their productive capacities and future earnings, while societies invest in education to sustain productivity, competitiveness, and growth. Retraining, upskilling, and the expansion of scientific and technical knowledge thus emerge not as moral or cultural imperatives, but as rational responses to persistent technological transformation.

By reconstructing this trajectory, the article has sought to clarify how education was progressively transformed from a philosophical concern into a formal economic variable. Understanding this transformation is essential for grasping both the intellectual origins of contemporary educational economics and the assumptions that continue to shape current debates on learning, work, and technological change.

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