Rhetorical Determinism

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Abstract

Economists included knowledge their models to improve their explanatory accuracy. A major step was to describe the production of knowledge as well as its exploitation as an internal part of economic models. Politicians prefer to talk about a new kind of economy so they can sustain the myth of progress. Rather than explain economies using a new model they try to leave economic history intact while describing the future using the new and different model. Once the knowledge economy became a progressive new entity and embedded in political rhetoric at the highest level, institutions competing for resources have to adopt the vocabulary and redefine themselves as knowledge organisations. As more and more professions, firms and organisations described their activities in terms of the new knowledge economy, so performatively the knowledge economy became part of political reality. Knowledge is metaphysical. If it has any kind of existence then it is embodied and projected through the skills of the knowers. Since technology connects with all human activity, the reformulation of institutions and priorities demands changes to descriptions of what technology is. Knowledge is at one end of a spectrum. Whim is at the other end. It makes little difference to economic models what the algebraic terms are called. Talk of the knowledge economy is therefore simply a way of saying our cultures and therefore our technologies are dynamic.

Political Rhetoric

Politicians have heralded a new knowledge economy[1]. "Europe's leaders", for example, have recently "set out a strategic vision" to turn "the European Union into a world-class … knowledge economy"[2]. Previously, in 1997, US President Clinton in his State of the Union address highlighted the "education standards" needed for success in "the knowledge economy of the 21st century" which he linked with "the power of the Information Age"[3]. Tony Blair, the British prime minister, at a conference in 1998, acknowledged, "we are entering a knowledge economy"[4] and, two years later he was able to report, "[t]he new knowledge economy is here, and it is now"[5]. On the same occasion the Portuguese prime minister, Antonio Guterres, declared "[t]he transition to an innovation and knowledge based society and economy is now under way."[6] Blair's ministers, added a sense of urgency. Stephen Byers, Secretary of State for Trade and Industry, announced that "[t]he shift from an industrial to a knowledge-based economy at the beginning of the 21st century is quite as profound as the move from an agricultural to an industrial economy at the beginning of the 19th century"[7] , and his successor, Patricia Hewitt, clearly saw the situation as one that demanded action from politicians when she said "The global knowledge economy confronts British politics, and politicians, with … large challenges"[8]. In Canada, "the real Canadian story is", announced Finance Minister Paul Martin, partly "about the extent to which [Canada has] embraced … the knowledge economy"[9]. For Industry Canada, this knowledge-based economy has the "ability to generate and use knowledge [as] a determinant of wealth"[10].

Politicians from many other countries, are involved, for instance this year, "[h]igh-level delegations from Brazil, China, and India gathered on the outskirts of London … to design preliminary strategies on how to help their countries succeed in the global knowledge economy of the 21st century."[11] In South Korea "a vision of … becoming a knowledge-based economy has now become a key objective of government policy"[12]. And a commentator reports that a "transformation … has quietly begun … of the Singapore economy into a knowledge economy"[13] which is compelling "Singapore's politicians … to grapple … with the power equation as the new knowledge economy redefines leadership roles"[14]. In the wider Asia-Pacific region leaders have "underscored the importance of knowledge as a key driver of future economic growth and development"[15]. The knowledge economy has therefore become a significant term in the rhetoric of political leaders and they seem to agree that "[t]he society we live in has been gradually turning into a "knowledge society,""[16] and that this incorporates a new kind of economy.

Economic models

Kenneth J. Arrow was an influential economist who wrote about knowledge as a component in models of economies. In particular, he incorporated in his theories terms representing the process of acquiring knowledge — learning. Learning he associated with doing, and knowledge with experience. He regarded experience and knowledge as a stimulus to technical change

while simultaneously technical change is a cause of environmental change and accordingly an agent in the production of new knowledge. He observed that since knowledge and technical change feed off one another, knowledge is not something that is static and asserted that "knowledge is growing with time" [17].

Arrow's aim was not to generate a model of a new kind of economy, but to make good some of the deficiencies in existing models. Paul Romer, who took up Arrow's work used data series dating back over several centuries to motivate the study of models that incorporated knowledge. For instance he looked at data for the Netherlands, Britain and the US from 1700 until 1979, data about the US from 1800 to 1978 and statistics derived from data series that began no later than 1870 from Britain, France, Denmark, US, Germany, Sweden, Italy, Australia, Norway, Japan and Canada. Romer, therefore, was not referring to a new economy, but to an economic model that fitted historical data, similarly Arrow's economic model was inspired by earlier observations, for instance, by empirical work from 1936[18] that revealed the cost of production diminished with experience. These economists did not, therefore, regard the knowledge economy as a new phenomenon.[19]

Knowledge

For those that construct economic models knowledge is simply a variable in the equations and can be aggregated so that "the state of knowledge", as Romer puts it, can be "denoted by *k*"[20]. One of Arrow's insights was that by making knowledge instrumental, knowledge did not need an interpretation. Arrow merely noted that knowledge is "difficult to measure" [21]. There is no need for elaboration, however economists seeking a connection between their knowledge variable and the use of the word 'knowledge' might see it, in their jargon, as "the basic form of capital"[22] or an "intangible capital good".[23] This intangibility though turns knowledge into an enigma.

It seems knowledge "flows"[24,25], forms a "current"[26], enters through "channels"[27] or "a conduit"[28]; a "stock of knowledge"[29] can be held in "stores"[30] thus there are "repositories of knowledge". Knowledge can be "tapped"[31], "excavated"[32]or perhaps "mined [from] the richest veins of ideas"[33] or extracted from "low grade ore"[34] using "tools of knowledge extraction"[35]. It can be put in "harness"[36], "filtered"[37], suffer "absorption"[38], or "diffusion"[39]. It has a "volume"[40] that can be contained in a "pool"[41] or a "reservoir"[42]. This torrent of metaphors makes it evident that it is difficult to pin down knowledge.

For philosophers, the topic of knowledge has been problematic, particularly when it was linked with the troublesome notion of truth[43]. Wittgenstein offered a clue to an alternative when he wrote "The grammar of the word "knows" is evidently closely related to that of "can", "is able to""[44]. Helpfully, he added in parentheses "('Mastery' of a technique,)"[45].

From a behavioural point of view, what causes us to say that people have knowledge is something about their performance. Knowledgeable people have a skill and a skill is a practice executed well. Knowledge, then, is a word that is instrumental in explanations of practices and does not have to correspond with any distinctive mental object. But to say someone has knowledge requires a judgement, which is inevitably culturally specific.

Distinction

There have been attempts to categorise knowledge in various ways[46,47]. A common distinction is made between knowledge that is embodied[1] — dubbed tacit knowledge — and *signs* of knowledge imprinted in artefacts that can be transferred and copied — often termed codified knowledge. Tacit knowledge is said to be "codifiable if it can be written down and transferred easily to others"[48].

Authors go to some lengths to uphold the differences. Tacit knowledge or "human capital"[49] is said to be "slow to acquire and much more difficult to transfer"[50], "more internal and experiential"[51], "subconsciously understood and applied, difficult to articulate, developed from direct experience and action"[52], "held in the mind/brain"[53], "inside the heads of people"[54], unsharable[55] and "highly personal"[56].

Codified knowledge, or explicit knowledge is said to be "expressed in words and numbers … easily communicated and shared in the form of hard data, scientific formulae, codified procedures or universal principles"[57] , "an abstract mathematical formula derived from physical experiments or a training manual describing how to close a sale"[58], "knowledge that can be codified into written rules, facts and instructions"[59], "procedure manuals, product literature, or computer software"[60], sharable[61]. Explicit knowledge is treated as though it were a material *sign* of knowledge.

The distinction is attractive to economists because codified knowledge, linked to artefacts, can be regarded as capital and tacit knowledge as a component of labour.

Sharing

A crucial consideration for Arrow was that "[l]earning is the product of experience"[62]. Romer however presumed that somehow the results of experience could be easily transferred from one person to another. The effort involved in creating a new design, Romer assumed was made easier by the availability of (rather than experience of) previous designs. He thought that once

[1] I perhaps need to add embodied in people. Embodied is sometimes used to refer to artefacts.

someone had created a design, "other inventors" could "spend time studying the patent application … and learn knowledge that helps in the design"[63] of new goods.

It is commonly supposed that knowledge can be transferred or shared, that "technology has made the transfer of knowledge easier and cheaper" [64] and that it is the role of "knowledge management" to ensure knowledge is "acquired and well shared within firms"[65]. It is first anticipated that "we can translate partial and implicit knowledge … into organized explicit knowledge."[66]; secondly it is assumed that "once … knowledge is codified, it can be spread easily and cheaply"[67] and that "knowledge can be freely transported"[68].

From a behavioural point of view, the outcome of learning is the ability to display a skill (such as passing examinations) recognised by an authority. A student, who the authority judges, can convincingly imitate an authorised teacher would be said to have gained knowledge.

Artefacts that help learners create the illusion that they contain knowledge. Particular kinds of artefacts, like textbooks, provide evidence of an author's skill and, it is commonly inferred, knowledge. Exposure to such artefacts can guide students in their attempts to mimic the habits of the author, and because the textbook can help the student compare the product of their skills with those of an absent author, the textbook is sometimes assumed to contain or carry the author's knowledge. But books do not have the skills that people have, so they cannot be said to be knowledgeable, nd students cannot be said to have the same skills as the author but merely that they can generate similar results.

The transfer of knowledge through artefacts is therefore an illusion. An artefact, such as a book, is, at best, a sign of knowledge rather than a carrier. The reaction to such signs is culturally and contextually specific. In suitable circumstances, however artefacts like books incorporated into a customary educational practice can guide students in their attempts to mimic the practices of authors and teachers.

Intrinsic Knowledge

Skilled practices involve groups of people in environments that inevitably include artefacts. Artefacts can spawn new practices and, occasionally, the new practice has an outcome that is analogous to an outcome of an established practice. A new combination of artefacts and practices can then act as a substitute for a tradition.

People find some skills more demanding than others, and when a new, surrogate practice is less burdensome than the customary practice then the differences might be attributed to the change in the repertoire of artefacts. The required skills are diminished when artefacts are introduced, thus artefacts appear to substitute for fragments of skill, and knowledge, no longer needed by the practitioners, appears to be transferred to the artefacts. A calculator, for instance appears to acquire knowledge of addition, or a videodisk of Hamlet, the skill of acting.

Two similar illusions arise the first because some goods facilitate learning, and the second because some undemanding practices involving artefacts can replace expert practices. Both of these illusions give the impression that knowledge is intrinsic to material goods.

People are deceived into believing that measures of material goods also quantify the knowledge they supposedly contain. Policy makers then become anxious if their community cannot generate signs of knowledge in sufficient quantities. For example, a government agency is concerned when the country "only produces 2.7 per cent of the world's scientific papers"[69].

The Myth

Berkeley, the eighteenth century philosopher appeared to concur with the view that words and signs contain knowledge. "[W]ords", he wrote, "are of excellent use". "By their means", he continued, "all that stock of knowledge which has been purchased by the joint labours of inquisitive men in all ages and nations may be drawn into the view and made the possession of one single person". Unfortunately, however, he added, "most parts of knowledge have been strangely perplexed and darkened by the abuse of words"[70].

First there is the difficulty of codifying knowledge. Diderot, in an account of his work of collecting data for the Encyclopédie, complained,

> "Most of those who practise the mechanical arts … operate merely by instinct. Among a thousand one will be lucky to find a dozen who are capable of explaining the tools or machinery they use, and the things they produce, with any clarity"[71].

Worse still, some machinery defies description. Diderot explains,

> "[T]here are machines so hard to describe and skills so elusive that, short of trying the work oneself and operating the machine with one's own hands and seeing the product with one's own eyes, they are difficult to describe with any accuracy."[72]

Even if the difficulty of creating an intelligible formalism has been overcome, the interpretation of the record is not necessarily reliable. In a play by Arthur Miller, a character Chris asks, "The court record was good enough for you all these years, why isn't it good now?" and in reply George says

> "But today I heard it from his mouth. From his mouth it's altogether different than the record. Anyone who knows him … will believe it from his mouth"[73].

In an industrial context, once a record is made and read it does not necessarily allow a reader to reconstitute the skills of using or building machinery that were supposedly recorded. In some cases, Diderot reports, that the only way the writers could find out about certain operations was to learn to do it themselves by operating the machines and making some products. He observed, "in the studio it is the moment that speaks"[74] and concluded that "it is not through books that we can learn how to manipulate tools and machines".[75] As Landes colourfully puts it, "It takes more than recipes, blueprints, and even personal testimony to learn industrial cuisine"[76].

Basalla, who wrote about the evolution of technology offered an example. He explained that when a textile business was to be set up in the US "[h]aving the actual machines did not suffice"[77] since "*all* of technology can never be translated into words, pictures, or mathematical equations" so "the practitioner with hands on knowledge … will always have a role to play in the dissemination of technical innovations"[78]. He concluded

> "Although much of modern technology can be gleaned from the pages of books, articles, monographs, and patents, the artifacts must be studied at first hand, oral information gathered from the persons conversant with the new technology, and the innovations adapted to the recipient economy and culture."[79]

Even so

> "all of the relevant information needed to build an intricate machine could not and, indeed, still cannot be conveyed in pictorial form. This holds for seventeenth-century engravings as well as for the best modern engineering drawings. "[80]

More recently, engineers "could not have launched the transistor industry in Japan had they stayed at home and relied solely upon the printed page for their knowledge" [81]. Basala explains, "[t]heir understanding was gained not only by reviewing the printed technical information but also by observing … and questioning specialists who were immersed in semiconductor technology"[82]

Often skilled people, in addition to instructive artefacts, are needed to provide lessons for local workers. "Successful transfer of textile technology was not achieved", in the example offered by Basala, "until experience British emigrant artisans were able to put their nonverbal knowledge to use and produce machines for the American manufacturers" [83]. And in expanding manufacture of field guns in America, the French eventually had to send "a team of workmen" to demonstrate how to "get pieces of comparable firepower and stability" to those manufactured in France[84].

In spite of the availability of machinery and industrial recipes, manufacturers have often preferred to establish new production facilities by relocating skilled people. At one time "[t]he French imported Germans with metallurgical skills; the Russians brought in Dutch, Germans, and Swedes"[85] and "in 1718–1720 … France launched a systematic pursuit of British technicians"[86] although "the … British passed a law prohibiting the emigration of certain skilled craftsmen"[87]. More recently, "the confiscation of German industrial patents … did not … benefit competitors …. The biggest American firms, with the best American chemical engineers, did not know … how to make them work. So … they hired away German chemists"[88]. These are approaches that continue today where "[s]ome developing countries have experienced large inflows of skilled immigrants, [and] … [o]ther countries have imported technical knowledge embodied in the human capital of hired foreign experts"[89].

Formalisation does not provide a universally easy route to those who wish to be credited with having a fragment of knowledge. But, Landes claims, "formal education for the diffusion of technical and scientific knowledge had momentous consequences"[90] and he suggests this was partly because "it almost always entailed instruction in abstract and theoretical matters that lent themselves to a variety of applications"[91]. Abstractions and theories are signs which can be easily reproduced which perhaps had little direct effect on the practical skills of the engineers. More significantly they encouraged the industrialisation of education. It allowed larger numbers to be educated in specialised educational institutions. The formalisms forced them to rehearse a similar vocabulary and they became skilled in the same academic practices. What the formalism did was to create solidarity between generations of students. It homogenised engineering culture and created an influential internationalised profession.

Often signs of knowledge can be easily reproduced but it is a mistake to extrapolate and suggest that therefore practitioners can effortlessly acquire skills.

Assumptions

Romer treated the explicit knowledge that appears to be embedded in products as a special kind of capital. In particular he assumed that once codified, in products, designs or patents knowledge could and would be shared. This allowed him to create new models and then draw novel conclusions that fitted experience of economies rather better than earlier models. But to make his models tractable Romer had to make a number of assumptions. First he took "the defining characteristic of technology" to be that "[o]nce the cost of creating a new set of instructions has been incurred, the instructions can be used over and over again at no additional cost"[92]. A dubious assumption in view of the apparent difficulty in transferring skills and knowledge.

To keep the analysis simple, the economists' models have also tended to emphasise only the skill and hence

the knowledge involved in the production of capital goods. They have ignored other social activities and consequently adopt a peculiar view of knowledge and indeed a society. Their preoccupation is with skills that have a productive value in industry. This view of an economy aims to demonstrate a continual accumulation of industrial knowledge in unison with improvements in production.

But, consumers too have skills. Produce, even a humble potato, requires skill in its use. Consumers have social skills that help them select acceptable uses for produce, manual skills for manipulating and processing produce and cerebral skills for co-ordinating their actions and foretelling consequences. Consumers too will modify their practices in the light of their accumulated experience — the experience of living. Knowledge, then, can also be attributed to the consumers.

The industrialists can only be integrated into an economy if some of their goods find a place in a culture beyond industrial production. By accident they may find their goods in demand however the continued consumption of their goods is not solely dependent on their skill in production, but also on the wider cultural acceptability of what they produce and hence the skills and knowledge of others.

Repercussions

One commentator writes "Pundits and politicians are forever proclaiming that we live in a knowledge economy"[93], another that "Today's economy is driven by knowledge"[94] and a report from an international agency announces that "a modern economy is in large part a knowledge-based economy"[95]. Assimilation into the knowledge economy is seen as a political priority. A prime minister claims "the knowledge economy is our best route for success and prosperity"[96] and confirmation comes from an inter-governmetal agency, which announced "Knowledge is becoming an increasingly important stimulant of economic growth"[97]. The rhetoric stresses the "the rising importance and potential of knowledge in economic development"[98]. According to an observer "The old foundations of success are gone… Suddenly the answer is "knowledge""[99]. Apparently "knowledge is the most strategic resource of the firm"[100].

With such a powerful link being made between knowledge and success, astute politicians are bound to reformulate their descriptions of political activities and goals. Even fears take on a new form. Bill Clinton recognised "an unholy axis of new threats: terrorists, international criminals and drug traffickers". He worried that "[t]hese 21st century predators feed on technology and the free flow of information, ideas and people."[101]. Industrialists too will adjust priorities to match the newly emphasised threats such as the fear that "[w]hen staff leave the firm they take their knowledge with them"[102] and new questions about control are raised when tacit knowledge is thought to be "the source of a firm's competitive edge … [which] is much more difficult to monitor than machines or manual labour"[103].

Institutions

Enthusiasm for the rhetoric of the knowledge economy has led to the conclusion that "organizations processing knowledge are more significant … than organizations processing commodities"[104]. Institutions that can claim to support the generation, processing or transport of knowledge might, therefore, gain political leverage.

Universities, for instance, might maintain that their roles include "producing new knowledge and adapting knowledge produced elsewhere"[105]; administrations might suggest that governments "serve as a conduit for new knowledge"[106] and that "[g]overnment is a major player in the knowledge driven economy."[107]; and certain public institutions gain political weight when it is declared that "the "knowledge infrastructure" … includes … the education system and the public library networks"[108].

Education gains influence when it is widely assumed that "[c]ritical to the success of a knowledge-based economy is a strong education system"[109] and that a "successful knowledge-based economy requires large public investments in education"[110] Evidence of political support for education appears in a government pamphlet that first asserts "London has the most developed knowledge base in Europe", and continues, "A key element of this knowledge base is undoubtedly the region's education and training institutions" [111].

Investment in research institutions secure priority with the assertion that "[p]art of the drive towards embracing the knowledge driven economy must be to accelerate the pace of development in science and technology"[112] especially when it is also reported that "economists agree that creation of new technological knowledge through research is our most direct economic avenue for acquiring added value"[113]. Outlays in "time and money in research and development"[114] are warranted by claims that "[b]asic research … advances knowledge"[115] and that "to succeed in the emerging global knowledge economy it is essential to have the capability to perform cutting-edge research" [116]. In more colourful terms it is declared, "A nation's science, engineering and technology (SET) base … is the engine-room that powers and ultimately underpins a nation's position in the knowledge economy"[117].

The availability of political credit causes some economic sectors reframe their activities: for instance, medicine is politically resituated by the claim that "We're seeing a shift to more of a knowledge economy, particularly in health care"[118]; newspapers are promoted as "one of the cheapest ways to communicate knowledge"[119]; and "professional services" are repositioned as organizations that "rely heavily on knowledge"[120].

Industries such as "agriculture, mining, ceramics, textiles, and electronics" are realigned to become "strongly knowledge-based" and on occasions "some traditional or indigenous wisdom or cultural assets"[121] are considered to be knowledge based industries.

The institution of work itself gains support when knowledge is seen as "a side effect of work"[122], and locations, such as Silicon Valley can gain authority, if it is "knowledge …that gives … the cutting edge in everything that it does"[123]. Branches of manufacturing are absorbed into the knowledge economy by the assertion that they are "knowledge intensive" including "information and communications, aerospace, environment, bioengineering, and mechatronics"[124]. Vehicle manufacturing is resituated by the disclosure that "about 70 per cent of the production cost of a new car can be attributed to knowledge-based elements such as styling, design and software"[125]. Supporters of the New Zealand economy point out that their country has "excellent examples of knowledge-rich enterprises, particularly in electronics, software, biotechnology, banking, fashion design, filmmaking, education and some agricultural products"[126] and that "agriculture will be at the heart of any knowledge economy for New Zealand"[127]

Failure to become labelled as a component of the knowledge economy confers political weakness. Industries would be wary of being associated with the old economy after the announcement that "in the context of the knowledge economy … Australia is too heavily reliant on its traditional 'old economy' industries"[128].

Professions

Members of professions seek enhanced status by claiming they are knowledge workers. The ILO lends legitimacy to claims that managers and senior government officials, professional workers, and associate professionals are knowledge workers.[129] For some people "[k]nowledge workers are defined as: [p]rofessionals with specialized skills and information; [e]ngineering, scientific, and technical workers; [d]ecision makers at the top level of management"[130]. There is a tendency therefore to emphasise existing rankings of professionals.

Some see entrepreneurs as the "key players" in a knowledge economy[131], but according to Peter Drucker, in the knowledge revolution "the key to maintaining leadership … is likely to be the social position of knowledge professionals and social acceptance of their values"[132] . Consequently, new positions are created such as the "Chief Knowledge Officer"[133] and the "knowledge manager".[134] There are claims that knowledge workers do particular kinds of jobs which involve manipulating "symbols rather than machines" and this, apparently, includes "architects and bank workers, fashion designers and pharmaceutical researchers, teachers and policy analysts"[135]. In the field of food preparation too it is argued that there is a growing "knowledge component, for example the skills of the chef and the atmosphere, or brand name, of the restaurant"[136].

Definitions of knowledge workers can also exclude certain occupations and an anonymous writer complains when the OECD definition embraces "hospital cleaners … as knowledge workers"[137].

Technology

Some specific industries use the rhetoric of the knowledge economy to their advantage. The computing and communications technologies, for instance, are transformed into "the facilitators of knowledge creation in innovative societies"[138], "central … to knowledge acquisition and diffusion"[139] and likely to be in an "enabling role" in an ideal knowledge based economy[140]. "[T]echnologies, from e-mail to cellular telephony to teleconferencing" gain repute because they "let more and more people share knowledge"[141]. "The opportunities", it seems, "are great for developing countries to take advantage of the new information and communications technologies in disseminating knowledge"[142].

The claim that "[d]igital technology is the nerve system of the knowledge driven economy"[143], gives credence to the assertion that "[d]igital technologies are a key enabler of a modern, knowledge driven economy"[144]. The Internet acquires status when, it is announced that, "[i]n the US, Australia, the United Kingdom, Canada, Finland, and Ireland, the growth of the Internet and other related new technologies have become the catalyst for the creation of 'knowledge economies'."[145]

Talk of technology becomes dominated by "the new information and communication technologies" which are thought to "hold great potential for broadly disseminating knowledge at low cost, and for reducing knowledge gaps"[146] and by "research technology that produces knowledge" [147]

The economists though in an attempt to simplify their models have tended to locate knowledge creation in the research arena and knowledge use in the construction of production systems. Arrow, for instance, assumed "new capital goods incorporate all the knowledge … available"[148]. He did not allow for improvements made by the production workers, users or consumers of goods. This standpoint was taken up by Romer who saw "new knowledge … translated into goods with practical value"[149] and "technological change" as "improvement in the instructions for mixing raw materials" [150]. He treated research as a special kind of production system in which "human capital and the existing stock of knowledge" is used "to produce new knowledge" which form "new designs". Knowledge is created through the application of technology to research and creates "a maximum technologically feasible rate of growth for knowledge"[151]. The transmission of knowledge from a new design takes place, according

to Romer, because it increases the stock of knowledge available to the research sector.

Culture

Arrow thought it obvious that "knowledge is growing in time" so that "[t]he stock of knowledge", as Romer asserted, "goes on growing"[152] and "will grow without bound"[153]. Other authors too see knowledge as boundless and assume "[t]he new knowledge economy is based on … an infinite resource"[154]. There is a rhetoric of growth. President Clinton reported, "[t]he entire store of human knowledge now doubles every five years" [155]. Another suggestion is that "[t]hirty years ago, knowledge doubled every fourteen years—it is now doubling every seven years"[156] and it is anticipated there will be "an acceleration in the growth of the stock of codified scientific and technological knowledge"[157]. Romer also wrote that "Knowledge does not depreciate" [158]. The implication is that the knowledge attributed to artefacts including publications increases. According to these assumptions the designer of new products can "take advantage of all the additional knowledge accumulated … during the last 100 years"[159].

A casual glance at Diderot's eighteenth century encyclopaedia reveals that printed descriptions, artefacts and practices can become obsolete, so not everyone agrees that useful knowledge expands. Some warn that "knowledge and expertise that can be shared often quickly becomes obsolete"[160] and although "[k]nowledge is an infinitely expandable, intangible asset" it has "a relatively short productive lifetime"[161]. "Most of our knowledge", it is surmised, "is transitory"[162]. Authors speculate on the cause; one suggests "new knowledge makes old skills obsolete"*[163]* and another that "technological advances … speed the depreciation of human capital"[164]. Thus new knowledge overwhelms old knowledge.

What can easily expand are stocks of the signs of knowledge. If knowledge is embodied then it is the human capacity to practice skills that imposes a bound. Unread books do not constitute knowledge. More knowledge would seem to imply a wider variety of human pratices however information and transport technologies are homogenising experience and practices.

Quantification of knowledge is a dubious art and whether or not knowledge is growing is part of a fruitless debate. However talk of the growth of knowledge is a symptom of changing cultural practices. Physical, chemical, biological, technological and social processes change what are considered to be satisfactory practices. They alter what is to be known, make existing embodied knowledge obsolete and increase uncertainty. Offensive warfare, for instance, accelerates these entropic processes.

Many accounts of the knowledge economy privilege knowledge generated by professional researchers and used in creating capital goods employed in industrial processes. Some completely ignore the knowledge attributable to other social activities. But by failing to accredit other social activities they miss out swathes of human activity from their models. Recognising that everyone is engaged in social practices and therefore everyone can be said to be knowledgeable would create a different interpretation of the knowledge economy.

Denying that someone's practices are informed by knowledge suggests their actions are founded in opinion or whim but this is just a relabelling of invisible magical causes. The economic models work just the same if the variables are labelled whim or opinion instead of knowledge.

If we cease to worry about unquantifiable growth in knowledge and assume that what happens is our practices change in response to whim, opinion and knowledge and simultaneously our practices change our whims, opinions and knowledge. Fashion becomes as significant as knowing and to say we have a knowledge economy is simply to say we have a dynamic culture.

Conclusion

The knowledge economy is grounded in a mythical commodity.

The myth is promoted by the rhetoric that tells us we have moved to a new kind of economy, a knowledge economy, where technology has speeded the flow of knowledge. Politicians have accepted the myth and through their turns of phras have changed how roles and institutions are described and valued. It has changed, for instance, our view of technology. Technology has gained some esteem. Technology is no longer primarily about polluting factories but principally about exploiting, processing and conveying information.

The 'knowledge economy' is a phrase, a rhetorical device that is performative. We have a knowledge economy because we choose to talk and write about our activities with reference to the phrase. That is the political fashion.

The knowledge economy is therefore a rhetorical term that currently confers privilege. It has privileged the information technology industries, research institutions and universities in particular. In the name of the knowledge economy emphasis has been placed on establishing an international culture and if a claim could ever be mounted about the relative scale of embodied and hence usable knowledge, then the homogenisation of cultures probably has reduced what is available. More knowledge should lead to a greater variety of practices. What we see in the increasing levels of telecommunication is a homogenisation of culture, that is the same culture involving more people. This does not imply more knowledge but less.

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