

Internet and the Shifting Grounds of Knowledge

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One way of looking at the Internet and its effects is to see how the traditional (meaning, modern!) activities and institutions make use of the Internet to augment and advance their traditional activities. How through the use of Internet certain activities are facilitated, made faster, cheaper, easier and so on. When we look at the immense amount of information that is available on the Internet and round the clock access to this information for millions of users, we are looking at the Internet as a set of tools and techniques which we can apply to perform tasks and fulfill functions that we were doing earlier, but which can be done better now.

It is comparatively more difficult to discern the significant qualitative changes that may be occurring on account of the Internet. With the growth in electronic connectivity and development of increasingly more sophisticated handling and manipulation of information, we may need ways to discern precisely such qualitative and epoch making changes. Since we are ourselves in the throes of change, we do not have at our disposal a method, or a well-rounded perspective, which can be applied in order to understand how our lives and societies are changing. This is especially true with regard to the question of knowledge. How do we judge the claim that the grounds of knowledge are shifting in the Internet era, which indeed is the claim we are advancing in this paper? And, why is it important after all?

The idiom of knowledge

We can perhaps begin by noting that it is now possible to talk and frame our questions in terms of 'knowledge'. A certain language, or idiom, is available to us so that we can talk about production of knowledge, ownership of knowledge, power and knowledge. Social discourses are full of references to knowledge economy, knowledge society, knowledge management, and so on. Earlier, when we discussed questions of knowledge we discussed questions of science - questions of evidence, argument, justification and scientific discovery, or we discussed philosophy of social science. Questions of knowledge were specialized questions to be dealt by epistemology or philosophy of science. Their effort was to establish and refine the foundations of knowledge and guard the boundaries of valid knowledge to protect it from pseudo-sciences and other unscientific intrusions. In the last few decades, we have come to see knowledge everywhere. It is in marketing, it is in forests among tribal communities, it is in machines.

We are emerging from an era where the grounds of knowledge were secure in the foundations of science. Science, or the university, as an institution authorized what was the right kind of knowledge and the rest of us didn't have to worry about criterion of knowledge. We have now moved to an era, where knowledge is every one's concern. Each one of us worry about having access to and possession of valuable knowledge which would increase our chances of survival and success in the emerging knowledge

society. Companies are worried about the control, management and possession of their employees' knowledge and the knowledge possessed by other companies. The whole idea seems to be to untie knowledge from its context, render it as existing something outside of us, and free it for circulation, organization, application and possession.

Knowledge activities on the Internet

It is in this context that we can speak of the 'explosion of knowledge' on account of the Internet. Whatever knowledge is to be found, there is a rush to 'digitize' it and put it on the Internet. The meaning of 'digitization' here can mean just a conversion of information in other forms into digital form – for example, books into electronic documents, or video cassettes into DVDs. Or it may mean something more – an incorporation of that knowledge into digital routines and organization that would make possible further development and use of that knowledge. For example, digital recording of a musical piece may merely serve as a record, like the older varieties of tape. But when this digital recording becomes a part of a larger database and the various elements of this recording are organised according to different logics of representation and used to make other music, something new is happening. What is happening is a new kind of knowledge activity. Even the traditional activities like music editing become transformed. The editor does not necessarily edit the music based on hearing but by looking at the visual representation of the sounds on the screen. This knowledge activity is taking place within the domain of the Internet.

But why call the activity of making music a knowledge activity? Here we can see a shift in the understanding and evaluation of knowledge, grounds for which were being prepared in the transition to post-industrial economy. The industrial economy was characterized by assembly lines where the workers performed a series of simple, repetitive tasks. Workers were not required to have any knowledge. All knowledge was embodied in machines and routines. There were many changes in the industrial economies after the Second World War. Service sector grew to much larger proportions, increased competition led to quicker obsolescence of products and incorporation of high technology in products, symbolic value of products became more important leading to growth of advertising and image building. These changes required that a larger proportion of workforce be more knowledgeable. In fact, 'knowledge economy' is understood to be characterized by the mobilization of diverse human faculties in the work process, including the social skills. As Nicolas Guilhot summarizes: "*It is a commonplace in the organizational literature to point out that, while the subjectivity of the worker was suppressed in the assembly line model, it is now at the center of the work process: interpretation, creativity, autonomy, flexibility and decision capacity are the qualities required from workers, even in the most industrial or menial settings.*"¹

Economy is central to the organization of modern society. This new perception of the economy summons a new perception of work process, which in turn requires that the role of knowledge be seen anew in all activities. All activities are in some sense knowledge activities. In the age of scientific method, knowledge that existed in society, among

people, was not considered knowledge at all. Knowledge economy is not concerned with how the knowledge is acquired; whether by scientific method, or through some other means. This broadening of the definition of knowledge is to be welcomed. It allows us to see the richness of knowledge that exists in society and how these knowledge can play a role in the reconstruction of society.

The cybernetic turn in sciences

Apart from the changes in the economy, there were changes taking place in the domain of knowledge activities itself - in science, and in the university. The period before, during and after the second world war saw the appearance of a new set of research programmes in various sciences which differ in their organization, conceptions, content from the classical science paradigm. These new programmes, associated in that period with the name of cybernetics, have as their fundamental categories related to control, communication and information. This current has influenced theories in physics, biology, linguistics, economics etc. Donna Haraway has examined the incursion of this paradigm in biology and cultural theory. With regard to fundamental conceptions of biology, she says: *“Nineteenth century scientists materially constituted the organism as a laboring system, structured by a hierarchical division of labor and an energetic system fueled by sugars and obeying the laws of thermodynamics. For us, the living world has become a command, control, communication, intelligence system in an environment that demands strategies of flexible accumulation.”*ⁱⁱ The genetic theory incorporates the concept of information in a fundamental way when the genes are defined as carrying information from one generation to another, which results in the reproduction of the organism. Philip Mirowski has produced an extensive documentation to show how the cybernetic vision has come to be incorporated into the science of economics over past decades. [In his words, ‘how economics became a cyborg science’, which is a word in vogue among some historians of science like Donna Haraway to indicate this new paradigm]. One can say that there is a transdisciplinary formation in the sciences, which increasingly employs the concepts of information, communication, and control in fundamental ways. The computer – as an idea, as an artifact – plays a crucial role in these conceptualizations. Peter Galison writes that: *“At first no more than a faster version of electro-mechanical calculator, the computer became much more: a piece of the instrument, an instrument in its own right, finally (through simulations) a stand-in for nature itself.... In a nontrivial sense, the computer began to blur the boundaries between ‘self-evident’ categories of experiment, instrument and theory”*ⁱⁱⁱ. These cybernetic conceptions disturbed the hierarchy of sciences with physics as the most fundamental science and also the strict divisions between natural and human sciences. Another thing to be noted is: *“It is a historical fact that each of the cyborg sciences traces its inception to the conscious intervention of a new breed of science manager, empowered by the crisis of World War II and fortified by lavish foundation and military sponsorships”*^{iv}.

As we can surmise, the development of the Internet itself is a part of this same history. Military purposes were extremely important in the origins of computer and the Internet. The university and the utopian ideas of free knowledge have played their role too. Conceptually, the Internet is of course dependent on the information sciences or cyborg

sciences. But in an exemplary cybernetic feedback process the Internet is now itself reconstituting the domain of knowledge in society. It is the advent of Internet that has enabled the idioms of knowledge society, knowledge economy, etc. to take centre stage and made knowledge central to post-industrial, globalised world.

A new kind of knowledge?

Let us ponder why are the Information Technology Parks called 'knowledge parks' or why the plans for making knowledge society always translate into building better computers, achieving better connectivity, and enhancing computer learning. Presumably the activities taking place in these places are considered knowledge activities. This is jarring to our university educated ears and sensibilities. We can understand activities being carried out in a physics laboratory with its equipments, wires, dials, and readings as a knowledge activity, which would result in the affirmation or discovery of a law, or a new application of such a law. But activities in a room full of computers, connected to each other and connected to the Internet, how are these knowledge activities? Especially because these activities are not geared to producing a new representation of reality.

We are arguing that the Internet is a domain of knowledge activities of a different kind. We witness different kinds of structuring of knowledge in the physics laboratory and in a cyber workstation or a control room. A physics research laboratory might seem disorderly to a non-initiate. The laws of order that apply here are derived from the laws of matter as discovered by physics. These laws are representations of reality. In a computer room the situation is different. Laws of physics are taken for granted. They are relevant only as far as the proper functioning of the computing machines is concerned. Interest here is not in going into the 'depth' of reality and wrest exact representations, which take one closer to truth. The interest is in organizing information and its flows in ever-new ways for ever-new domains. Physics takes apart the world to reorganize it in an orderly and exact manner. In contrast, knowledge itself is taken apart and reorganized in computers. Knowledge finds a new representation here.

Taking articles, books, pictures, songs and putting them on the Internet after digitizing them is only the preliminary form of representation of knowledge on the Internet. Even this is much more than a mere copy. Texts can be easily broken up and reorganized. They can be hyperlinked to other information in many different ways. These are just the basic features that are routinely employed by everyone using the computer. We have also referred to more sophisticated activity of music making on the Internet. Internet also makes real time collaboration possible where spatially distant agents come together to make something new. A lot of open source software is developed in this fashion.

We should note that even the music performed by flesh and blood artists that we enjoy listening to, whether through cassettes and CDs available in the market or even in live performances, are assembled together digitally. The 'knowledge' that the artist has, which is realized in his or her performance, is just one part of the knowledge activity that is going on in producing that music. If we take any domain of activity, be it culture and

art, or finance, or scientific research, or management of workers, or just travel – computer and internet play an important role in their organization. The more cutting edge the activity is considered today, the more sophisticated the digital management systems would be.

What is cutting edge to a computer enthusiast may sound like very superficial stuff to people who grew up with models of a quest for knowledge, whether in science or elsewhere. J. David Bolter in this book “Turing’s Man: Western Culture in the Computer Age” contrasts the emerging paradigm of knowledge in this manner: *“The man on a quest had to go to the ends of the world to learn his difficult lesson; in general he changed in the process. Not so for the computer programmer. He remains in the confined logical universe of his machine, rearranging the elements of that universe to suit the current problem. The programmer remains the same, and the world changes around him. Self-knowledge is not particularly his goal; self-improvement may be a goal, but this is understood in practical terms as increased efficacy. The programmer reworks his logical world to make it more efficacious or more comfortable, and he proceeds until he comes up against the ultimate electronic limitations of time, space, or logic. In the process, he learns nothing more than he put there himself, for he does not discover his world so much as invent it.”*^v

In the new technological forms of life, the emphasis is on creating self-correcting human-machine systems. This is the basic cybernetic problem situation. The more knowledge that can be wired into the system, the better such a system functions. This requires advanced forms of knowledge representation and ontological engineering. A lot of the trading in premier stock exchanges are performed automatically by such systems. A lot of military maneuvers by advanced armies are conducted by human-machine systems where the knowledge is coded into the very architecture of these systems. Massive experiments involving hundreds of researchers are designed in this fashion.

If we are looking at the Internet as a new domain of knowledge activity of a new kind, then we may be justified in saying that in this domain of knowledge: knowledge = (digital) representation of knowledge. This equation of knowledge with knowledge representation might sound logically odd (mixing up entities of different logical types) but it is nothing more than an Internet age commonplace: digital information = knowledge. What it means is that the premium, most well-paid, and ‘coolest’ knowledge activity is the knowledge activity carried out in the domain of the Internet and knowledge that does not or cannot find digital representation on the Internet is of little value, except when it represents a surmountable challenge for the activity of representation.

Data, Information, Knowledge

There is a common way of articulating the relationship between knowledge and information. It is represented in the form of a series: Data, Information, Knowledge, Wisdom. In this conception, knowledge is meaningful information. This might give the impression that knowledge is a higher order entity compared to information. This would

be true if 'information' is understood in the everyday sense as a bit of knowledge tied to a medium. In this case, knowledge is the fundamental concept through which the series data-information-knowledge is interpreted. All the terms in the series are defined in terms of knowledge.

But the information that is in information technology, the information that is flowing through the worldwide networks and in and out of our computers, cannot be understood as a bit of knowledge. This technological information can be understood only within a cybernetic conception. The basic principle of cybernetics is self-regulation and the basic interest is in building self-regulating or self-correcting machines.

In 1782 James Watt patented the fly ball governor for the steam engine. When properly functioning, this device would keep the engine running on a particular speed. If the speed increases, this increase of speed itself results in activation of a mechanism to bring the speed down. Similarly if the speed decreases, the speed will be brought back to the mean value which has been set^{vi}.

There are two important aspects to this mechanism:

1. a part of the output energy is redirected to the controlling apparatus further back in the causal order of the system – Feedback.
2. Feedback is such that it counteracts the action of the machine. It is corrective, not reinforcing. – Negative Feedback.

Target-seeking torpedo is a paradigmatic example of self-correcting system. A torpedo follows a moving target. This means the torpedo has to adjust its direction whenever the target changes its position or course. This is not simply a result of a force that is exercised by the target on the torpedo. Torpedo is powered by another device within it. Torpedo is not attracted but is steered toward the target – in response to an influence emanating from the target. But this influence is not a force, but of the order of a "message".

The dominant aspect of industrial revolution was power engineering. The pilot function of the governor was merely to ensure the steady functioning of the engine. In the middle of twentieth century, certain developments in various fields came together in the context of wartime efforts to push the creation of self-correcting systems or servomechanisms to the top of the agenda. Let us also remember that the idea of self-regulation was central to the conception of the economy in the industrial capitalist stage. Economy was conceived as a self-regulating system of markets. Labour market, consumer market, the market for raw materials are supposed to work in a self-regulating system, which does not require outside intervention. Karl Polanyi describes this beautifully in his book 'The Great Transformation'^{vii}. Actually, some also see the cybernetic idea of self regulation in Hobbes's conception of state.

Now the stage is set for Shannon's mathematical theory of communication and the concept of information that can be computed. What is a computer and communication system doing? It takes sounds, shapes, colours, and breaks them into bits of information - Zeroes and ones. These are converted into signals. An ordered procession of signals is

transmitted and then reconstructed into the meaningful information, sounds, shapes, etc, that we can read or understand. Shannon looks at information as the computer does. There is no doubt that this technical concept of information employs the commonplace concept, which was and remains the dominant meaning of information in discourse. The epithet 'information explosion' was in fact used first in the context of the exponentially growing number of documents, articles and papers, preprints, reprints that were circulating among scientists, policy makers and others. Documentation (in the library sense) was a method of handling this information.

Shannon uses information as a metaphor and generates a computable formula for its measurement in terms of a probabilistic equation. As is always noted, this information is without meaning. What happens is that now there is a concept of 'information in general'. Some of it is carrying meaning and some not. This generalized information functions in exactly the same way as the 'message' in a target-seeking torpedo - as negative feedback in a cybernetic system. So the information that is not meaningful in our terms is not necessarily noise. It may be doing the job of self-regulation or self-correction. Here truly the meaning is the message itself.

This conceptual development would have had limited significance, but for the technological developments leading to convergence of media and the concurrent development of the notions of information society. When it became technologically possible to convert 'all' forms of communication to the single digital platform, it became possible to think of information as independent of the medium. Information from any medium - texts, sounds, images - can be separated from the original medium and converted to digital form.

So we have a double concept of information associated with the digital revolution. The information which is pure meaning or representation, supposedly independent of any medium. And the information which is a message in a cybernetic system functioning as negative feedback, without any meaning. We have a world of meanings and representations which floats above, and is apparently independent of the underlying medium - the virtual world.

If we were to reinterpret the series data-information-knowledge in the light of this conception, we note that information is the more general concept in the light of which all other terms are to be understood. Some information could be meaningful and the rest would not be meaningful. Knowledge is merely the meaningful information. In a fundamental sense, knowledge is seen as being made up of information.

Reconstituting the domain of knowledge

We have been trying to articulate the way Internet constitutes a new domain of knowledge in society and how the conceptions of knowledge and knowledge activity here are differently constituted. There is no meaning in opposing the constitution of this new domain of knowledge and the associated new conceptions. What is alarming and eminently contestable is the fact that in the light of this knowledge activity, all

knowledge in society is seen now in a different light and cast in a new hierarchy. Digital domain now becomes the arbiter for deciding the value of knowledge of all kinds. This is so because virtual domain or the digital domain is becoming the commanding domain. As the Vidya Ashram call for contributions for a workshop stated: *“The activity, development, interaction, formulation, transaction, creation, invention, discovery, collaboration, criticism etc. in the virtual world have taken lead and tend to give direction to human activity everywhere, ...finance, science, art, entertainment, name any.”*^{viii} Society, economy, culture are being reconstituted in the process of the development of the global knowledge society and the domain of knowledge that is Internet plays a central role in this reconstitution.

The whole domain of knowledge in society is being reconstituted. We have noted the broadening of the field of knowledge which accompanies this reconstitution in the sense that all activities are seen in some way as knowledge activities. Various kinds of knowledge which exist in society among tribals, peasants, women and others are also accorded the status of knowledge. Then we also noted the contraction in the understanding of knowledge that follows from this reconstitution and the resulting hierarchy of knowledge when knowledge is reduced to digital information.

The effects of the reconstitution of the domain of knowledge on the university are only too evident. In the industrial society, university was the dominant place of legitimate knowledge activity. It was accorded an independence and authority which could not be challenged. Now the university is subject to a different logic of knowledge and is undergoing deep restructuring. What seems paradoxical is that as the economy is becoming post-industrial, knowledge activities of the university are subject to a process similar to that of industrialization. While the process of production in general is becoming more knowledge based and less Taylorized, Nicolas Guilhot notes that: *“the core activities of knowledge production and transmission – research and teaching – are subjected to an inverse trend, as the pervasive use of ICTs allows for the rapid Taylorization of these activities. Where teaching and research were still, until recently, “crafts” indissolubly attached to the person performing them, scholars are now regarded as a “bundle” of functions that can and should be “unbundled”, desubjectivized, and broken down into as many discrete tasks that can be fulfilled more efficiently, and on demand, by interchangeable operators – a development made possible by the pervasive introduction of ICTs as instruments of coordination.”*^{ix} Knowledge factories take on a very literal meaning here^x. Taking apart of knowledge and putting it back together is happening at an altogether different scale here.

It is neither possible nor desirable to go back to the older forms of university now. What is needed is the construction of a new perspective on knowledge, which sees a role for all kinds of knowledge in reconstructing the society. Development of such a perspective is possible only through dialogues^{xi}.

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- ⁱ Nicolas Gulhot : Paideia 2.0. <http://www.ssrc.org/blogs/knowledgerules/2008/03/10/paideia-20/>
This is a contribution on the blog 'Knowledge Rules' [<http://www.ssrc.org/blogs/knowledgerules/>], a good site for reflections on our theme.
- ⁱⁱ Quoted by Mirowski on p. 5
- ⁱⁱⁱ Quoted by Mirowski p. 15
- ^{iv} Philip Mirowski: Machine Dreams: Economics becomes a cyborg science, Cambridge University Press, 2002.
- ^v J. David Bolter: Turing's Man: Western Culture In the Computer Age, Penguin, 1986.
- ^{vi} Hans Jonas: "Cybernetics and Purpose" in The Phenomenon of Life: Towards a philosophical biology.
- ^{vii} Karl Polanyi: The Great Transformation: The political and economic origins of our time, Beacon Press, 2001. First published in 1944.
- ^{viii} New Command and the Knowledge Question, Invitation for contributions to a workshop on "Virtuality and Knowledge In Society" held at World Social Forum, Karachi.
[<http://www.vidyaashram.org/dialogues.html>]
- ^{ix} Also see the World Bank report to which Guilhot also refers: Constructing Knowledge Societies
http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2002/11/01/000094946_02102204203142/Rendered/PDF/multi0page.pdf
- ^x See the Edufactory website www.edu-factory.org for contributions to extended round of debates on the 'conflict and transformations of the university'.
- ^{xi} See a set of attempts at such knowledge dialogues at the Vidya Ashram Website www.vidyaashram.org