SEEING, LEARNING AND UNDERSTANDING IN THE MOBILE AGE

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Opening Session

Plenary talk (by Lara Srivastava) for translation and publication[1]
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Dissemination and Acquisition of Knowledge in the Mobile Age

Introduction

Thank you. First of all, I'd like to thank Professor Nyiri and the Hungarian Academy of Sciences for inviting me to speak today. It is both a pleasure and a privilege.

Judging from the conference programme, the days ahead of us promise to be stimulating and thought-provoking indeed. What I would like to do this morning is to share with you some of my thoughts on the evolution of knowledge acquisition and dissemination in an age which is increasingly mobile and in which technology and technical devices are everywhere, that is to say "ubiquitous". They are becoming, if you like, an afterthought in our daily lives.

I very much hope that the comments put forward and the observations made in this morning's talk will serve as useful material for the interactive discussions that will follow.

This, a mobile age?

The title of this conference is "seeing, learning and understanding in the mobile age". To begin with, let me try to understand why this, our age, is called a "mobile age".

- This is a mobile age first and foremost because access to information and communication is no longer fixed to any one particular location. Today's key technological trend is an increasing reliance on mobile networks and wireless technologies. Always-on access to information and communication, (for instance through broadband networks) and anytime/anywhere communications (through mobile phones), are seen to be the cornerstones of this technological era. Now, the combination of the two, that is to say ubiquitous, pervasive or ambient communication, heralds the promise of an environment in which technology is seamlessly embedded in daily objects, and yes, even people (think of RFID tags attached to objects and clothing, and implantable under human skin).

- Second, it is already the case that many people prefer to use a mobile phone even when a fixed line is available (and even when the fixed line is cheaper). Also, individual households in some economies are adopting wireless LANs to enable further mobility for their networked devices.

- Third, looking at market numbers, the number of mobile lines overtook the number of fixed lines on a global scale in 2002. This phenomenon applies not only to developed industrialized nations, but also to the developing world. In fact, the cross-over between mobile and fixed has taken place in a number of low-income African economies, mainly due to the low-cost of roll-out and the low level of fixed line

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infrastructure. The numbers support the fact that mobile technology and its widespread use is now a global phenomenon - this age can thus be usefully labeled a "mobile age".

- Finally, people, generally speaking, are themselves much more mobile. An increasingly globalized economy has meant more travel, more job mobility, and more mobility of homes and families. This has also meant the geographic separation of families and loved ones, of business colleagues, of educators and learners.

Characteristics of knowledge acquisition and dissemination (in any age)

To return to the title of this talk, let's examine some of the characteristics of knowledge dissemination and acquisition, be that in a fixed or a mobile age.

Information, data and facts, and the process of their collection are essential to the cognitive process and to knowledge acquisition as a whole. However, mere *information* is only the first step in the acquisition of knowledge for the learner. And its dissemination is similarly only a first step in *knowledge* dissemination. Information can be said to relate more to data and meaning, whereas knowledge must imply an acquaintance with this data and meaning through deeper study and investigation. The most relevant aspect for learning and knowledge acquisition is the "internalization" of information, that is to say that knowledge is born from information that must "engage" the learner, his or her faculties and character. Unlike data and facts, knowledge is not something that can be simply collected, memorized and regurgitated (for instance through technical agents like search engines).

It must be noted that the same kind of information (and knowledge) can be embedded or encoded in many different forms. The "indivisibility" of knowledge (and in this respect its limited transferability) is due to its immateriality. Knowledge (non-trivial knowledge that is) is always a complex assembly of relevant elements that all relate to one another. The diversity of knowledge further facilitates the innovative process by enabling the individual to make novel associations and linkages between these elements. Many of these elements are rooted, or inseparably intertwined, with certain contexts or certain knowledge bases of institutions or individuals. Obviously, there are many different kinds of knowledge, which are to varying degrees indivisible and transferable. A good example of this is knowledge that can easily be encoded into "blueprints" for others to use – indeed, indivisibility may apply less to this type of knowledge, than to knowledge, for instance, about political strategy. The indivisibility of knowledge is related in part to tacit elements, as certain tacit elements are only triggered or performed in that certain specific context. The subject of tacit knowledge and its indivisibility have been raised by a number of thinkers, including Polanyi. Using global networks of information, it is possible to "Google" blueprint-type of knowledge relatively easily, but the more tacit forms of knowledge (which are context-dependent) are much more difficult to disseminate through technologies like search engines.

Knowledge it is said, begets knowledge. Or if you prefer, we create resources by using the ones that we already have, in a process that involves furthering human development (technological, scientific and social). It is easier to build on related knowledge that has already been acquired, than to acquire purely "fresh" knowledge. In other words, learning is a cumulative process, and learning performance is greatest when the object of learning is related to what is already known.

We are aware that the acquisition of knowledge is a dynamic and evolutionary process, and can never be the same twice. Even though technologies such as search engines may be leading to uniform media for the dissemination of information, there will continue to be a non-uniform interpretation of that information. Acquisition of knowledge will always be characterized by cognitive path dependencies (a concept expounded by Nelson and Winter).

In sum, the points just outlined shed light on the same complex issue, only from different angles – the issue that we have a growing stockpile of networked information and knowledge (in whatever shape it might be) which can be interpreted differently by learners (individual and institutional), depending on their different backgrounds (wealth, accessibility, talent, cultures, education). And that this networked knowledge is richer for its diversity and individuality.

Opportunities for enhanced knowledge dissemination

Now that we have considered at some of the fundamental and timeless characteristics of knowledge acquisition and dissemination, what are some of the opportunities for enhancing these processes in today's mobile and Internet age?

The first is the opportunity to increase our collective fund of knowledge. It is a common understanding that learners of today have an instant and much wider access to information, through the use of new information and communication technologies. The increase in the collective fund of information, through content and information aggregators, results in the collective growth of knowledge, in turn translating into societal progress, and into greater individual and community knowledge acquisition. In addition, access to information, as a stepping-stone to knowledge, has now been extended to a greater proportion of the world's population. Moreover, information has become indexed, interactively searchable and accessible from any location. In this context, the power of knowledge to beget knowledge is also enhanced - the growth of information on global networks (accessed by learners) leads to the exploitation within the community of users of knowledge that might otherwise remain unexploited (e.g. talents or previous knowledge that are incomplete). The more information and knowledge are available through global networks, the more varied are the paths and opportunities for knowledge creation.

Indeed, with mobile technologies and the Internet, not only is the collective amount of accessible information and knowledge growing, but so is its diversity. The potential for cross-cultural knowledge exchange, knowledge transfer, and cross-fertilization of ideas is greatly improved through global networks and wider access. Diversity relates not only to the types of knowledge, but also to the shape in which knowledge is "encoded", or the shape in which it is accessible – for example, one can think of the many kinds multimedia and interactive tools available today and in the future. This will once again increase the potential reach of knowledge. Such tools, combined with always-on access, enhance the potential utility of complementary or supporting information and knowledge.

Another important opportunity is the "multi-dimensional space" afforded by the mobile age. Global networks, like mobile Internet networks, create <u>fluid</u> multi-faceted spaces for learning, which can re-enforce and further enhance knowledge dissemination, through the exploitation of the user/producer relationship with text and meaning. "Fluid multi-dimensional spaces", captioned thus by semiotician Roland Barthes, refers to the notion that a creator (or author) of text, does not constitute the <u>sole</u> determinant of meaning. A reader, too, contributes to the "production" of a text, i.e. through a process of individually specific "sense-making" on his or her own terms, by forging meaning through what has already been lived or seen or read.

A key implication of this multi-dimensional space is that it creates an enriched platform for discourse – an important element of knowledge dissemination. The phenomenon of discussion groups, for instance – forms a space where ideas are constantly blending and even clashing, thereby leading to greater opportunities for knowledge acquisition. In this respect, mobile and Internet infrastructures act as a catalyst for the flow and development of knowledge.

Opportunities for enhanced knowledge acquisition

Such are opportunities for enhanced dissemination of knowledge. But what might be the opportunities for the learner to enhance the knowledge acquisition process?

First, the fluid multi-dimensional educational space (which I just referred to) will have a significant and positive impact on personalized and customized knowledge acquisition through the use of new technologies. Every knowledge acquisition process is individual and specific. Learners are bounded by their own contexts, experience and history, in terms of how they acquire knowledge or solve a problem. These processes are social and institutional rather then purely individual, involving socially formed signs, meanings and habits of thought. Such cognitive path dependencies are both a positive feature of knowledge acquisition but also a limitation. These limitations can be curbed (and even capitalized on) through the use of personalized learning devices like the mobile phone, and through customized learning enabled by new intelligent networks and sensor

technologies. Through personalized mobile devices, we are already allowing for the role of individuality, and uniqueness, of knowledge acquisition.

Secondly, portable ICT technologies can make learning more time efficient, and permit more flexibility in the learning process, both in terms of content and of context. Moreover, information that becomes ambient and "ubiquitous" in our environment will enhance knowledge acquisition further, *naturalizing* in a way the internalization of information process. By this, I mean that the internalization process in a networked environment might be less conscious, less active and intentional, occurring throughout daily activities, rather than at designated instants. In a sense, when we talk about technologies of an "anywhere, anytime, nature" – we will also be able to apply this to learning, creating fluid "anywhere anytime learning" environments.

Third, as I mentioned earlier, knowledge and information do exist in different shapes. New technologies will enable their use and dissemination through even more channels, such as pictures, symbols, tactile and other sensory stimuli, further widening the potential for more diverse knowledge development.

Fourth, it is evident that the attribution of meaning to the apparently chaotic mass of data that we are faced with on a daily basis requires the use of acquired concepts, symbols, rules and signs. Often, as Geoffrey Hodgson points out, we have to rely on interaction with others to develop our cognitive skills, to form judgments about the world and to acquire guidelines for action. In this context, the peer-to-peer learning facilities enabled by mobile ICT technologies can greatly enhance the learning process.

Elements of a Faustian Bargain in the context of technological change?

I would now like to draw upon the notion of the **"Faustian Bargain"** in the context of technological change (put forward by, among others, Postman and Weinberg). We have already explored how the advent of new ICT technologies enhances the performance of certain "desirable" features of learning – but at the same time, we can scarcely afford to exclude from our considerations those aspects that seem to hamper the felicitous features inherent in the classical modes of learning or knowledge acquisition. In other words, we must take account of the truism that in any human enterprise, not only should we seek to maximize profit, but we must also reduce or eliminate loss.

My first point in this context relates to structure. Jean Baudrillard refers to a model of the media as a black hole of signs and information, which absorbs all contents into cybernetic noise, no longer communicating any meaningful messages. He goes so far as to say, that, and I quote, mass "information is directly destructive of meaning and signification". However we may interpret this, it does not seem contestable that there exists a potential risk of losing true meaning and significance in an increasingly unstructured sea of information.

The effect of information congestion on individual learners has already been remarked and examined, in various studies on the use of ICTs and productivity. A recent study undertaken at King's College (London) commissioned by HP, for instance, found that the onslaught of email has even had negative effects on I.Q. and on the ability of workers to focus on specific problems or tasks. It would seem that although technology and machines might "always be on", clearly human beings cannot be. I quote from an article in the Guardian covering the study:

> "Doziness, lethargy and increasing inability to focus reached 'startling' levels in the trials by 1'100 people who also demonstrated that emails in particular have an addictive drug-like grip. Respondents' minds were all over the place as they faced new questions and challenges every time an email dropped into their inbox"

> "The average I.Q. loss was measured at 10 points more than double the 4 point mean fall found in studies of cannabis users"…

> "The most damage was done, according to the survey, by the almost complete lack of discipline in handling e-mails"

> "Dr. Wilson and his colleagues found a compulsion to reply to each new message, leading to constant changes of direction, which inevitably tired and slowed down the brain"

"It's a recipe for muddled thinking and poor performance...."

"Manners are also going by the board, with one in five of the respondents breaking off from meals or social engagements to receive and deal with messages. Although 9/10 agreed that answering messages during face-to-face meetings and office conferences was rude, a third nonetheless felt that this has become "acceptable" and seen as a sign of diligence and efficiency".

This last quote even shows that new ICT channels, though in some cases fostering peer-to-peer learning, can also reduce the effectiveness of traditional forms of learning such as collaboration and socialization, leading to a net loss in the learning process.

Where there is an imposed structure to disseminated information, i.e. in the form of the "hit" order search engine classification, such a structure does not always closely match search requests or educational requirements. Can search engines really respond to a user's intention? Current search engines are limited due to lack of intelligence. Prioritization of the searchable and indexed data that is externally imposed is often random. There is the danger that we may only be increasing the amount of information available (and in some cases irrelevant data) but not its effectiveness or potential for internalization (e.g. think of the right-hand bar on Google which is meant to provide 'relevant advertisements'). Not only are there technical bottlenecks for the structured dissemination of information, but also cognitive ones, given that the ability to filter through an increasing sea of information will depend on individual competencies.

Furthermore, taking Baudrillard's analyses on simulacra and simulation into consideration, global networks like the Internet may be creating a type of "hyper reality" or a new "media reality". The number of hoax stories circulating on the Web are a good example - I am thinking of one in particular which reports plans of the US government to implant RFID tags into homeless citizens for the purposes of tracking. Such a story can be, in some cases and without necessary tools or prior knowledge, deemed as "true knowledge" by learners. Thus, educators and learners alike must be aware not only of the potential of global and mobile information networks to disseminate *bona fide* information, but also their potential to perpetuate false realities and "manipulated information", thereby creating an 'illusion' of knowledge.

My next point relates to active learning and contextual learning. ICTs open up new opportunities for active learning. However, with timely, tailor-made information delivery, there is the possibility that learners will no longer feel the need to go out and actively seek pertinent information and knowledge. For some learners, learning and search for knowledge may become an overly passive experience, one that may be exacerbated by intelligently ambient networks emanating information, anytime anywhere. Otherwise put, such an environment has the potential of encouraging a form of "cognitive inertia". The age-old human thirst and quest for knowledge must be maintained in such an environment, at both the individual and community level. Of course, as always, the propensity for "cognitive inertia" will greatly depend on the disposition of the learner and his/her own cognitive abilities and experience.

Contextual learning refers in part to the inherent indivisibility of knowledge. Contextualization relates new pieces of knowledge to other related pieces of knowledge, and is fundamental to knowledge acquisition. When children can Google anything from Aristotle, to reproductive health, to nuclear physics, there is always the possibility that some of this information or knowledge may be acquired out of context. So the question is how to ensure that the "right" (or " relevant") information makes it to those that require it, within the right context and in a timely manner? Even if such an information flow is somehow optimized, the question remains whether merely having facts and figures at one's fingertips leads to effective learning and knowledge assimilation? Certainly not – but are learners and educators truly aware of this?

My next point relates to the power of imagination in a mobile age. When tailor-made information can be rapidly delivered, it is possible that many perceived information needs, while easily satisfied by learners, are so only in a superficial sense. This may create an "illusion of knowledge" and have a negative impact on the learner's "power of imagination" or abstraction – a power which is essential to the cognitive process as it implies both the profound power of synthesis and insight. A delicate balance needs to be struck between knowledge and imagination, particularly as the overload of information over ICT networks runs the risk of limiting our human ability to imagine, and "fill in the gaps" in innovative ways.

Finally, I am also concerned about the diminishing role of serendipitous knowledge acquisition in an increasingly networked world. Although mobile and Internet technologies mean better accessibility for all, they may eliminate or adversely affect another important element of the cognitive process, e.g. what I would like to call "the wondering and the wandering". By this I refer to the role of "accidental" or "exploratory" learning in a pre-determined and customized learning environment. There is much value in learning "by accident", which might not occur as widely with increasingly sophisticated and targeted information delivery.

The increasingly ambiguous nature of knowledge-disseminating institutions

Knowledge-disseminating institutions using ICTs already play a key role in learning, and can greatly enhance the learning process. They enable the creation of knowledge from knowledge, at a faster rate, from any location, and through collaborative learning. By the same token, such institutions, like Google or Vodafone Live! are extremely powerful. Their repositories and categories can limit or de-contextualize information and knowledge, thereby creating more opportunities for illusory knowledge. It must be recognized that nothing can entirely replace tangible personal experience, learning by doing, and face-to- face discourse.

Moreover, a question is raised in terms of the relationship between commercial interests and public interests. How far is there a danger that the knowledge flow might be "manipulated" by groups or firms due to their commercial interests? The business model of Google, for instance, is becoming increasingly reliant upon advertising. On the other hand, sponsorship of this important role may be required, as long as manipulations can be kept at a minimum. It may be that new global organizations are required, in order to facilitate the monitoring of ICT knowledge-disseminators, and the fulfillment of certain minimum standards in the public interest.

Conclusion: Wielding the power of the mobile age and shifting the "Faustian Bargain" in our favour

The Faustian Bargain was eventually turned in our favour. I firmly believe that the same can be true of the Faustian Bargain relating to technology and knowledge acquisition. Indeed, it must, by the combined endeavour of all parties concerned. Awareness of risks and dangers, potentialities and pitfalls must be raised at this early stage of the enhancements to learning afforded by the expanding technologies of the mobile age. It is equally important to identify those traditional features of learning that are irreplaceable and may potentially be hampered by such an age, and devise means of protecting them. Indeed, one must come to terms with the limits of new technologies in order to fully take advantage of the benefits they offer.

These last comments bring this presentation to an end. The floor is now open to questions. And beyond that, I look forward to participating in further discussion over the coming days.

Thank you.

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