Shifting foundations of knowledge and their impact on e-learning strategies

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What will we discuss?

Using 4 example cases, we will show that expectations towards professional knowledge have changed in the information age. Information is not knowledge, yet the information society is strongly transforming our assessment of what we count as knowledge and its constraints. We will discuss how knowledge in several domains of human activity is tied to social constructs based on an underlying network. We will focus on this “Network of knowledge” and then assess the impact this should have on e-learning strategies. In particular, the future role of e-learning systems is discussed, looking beyond the current LCMS towards true Learning Networks.

In conclusion, we shall stress our strong belief that an ethical dimension is essential to professional knowledge. We will argue that E-Learning strategies should take this into account.

Case 1: Linux-installation

Unsurprisingly, we can find examples of current expectations on professional knowledge in the IT-sector. Let’s look at an IT professional who performs an installation of Linux. People will agree he/she “knows” how to do it, he/she is “in the know”. Yet, he/she has no knowledge of all details: there simply are too many details to be known. Often, such a system engineer will look up specific information about installation procedures and drivers on several websites, and will try to clear any ambivalence by chatting online or participating in an expert forum.

Although these are typical professionals who are highly regarded for their skills and seem to “know” a lot about computers that escapes other workers, they do not need no real insight in key explanatory mechanisms. Many of them do not know, e.g., about the basic mathematical foundations of computing. In fact, even though their knowledge is socially accepted and entrusted, when measured by classical epistemic norms one would have to concede their knowledge is based on very week justification.

There are several aspects of the processes they perform that they will fail to fully understand, this being caused by the true modular en layered nature of IT organization. Anyway, even while this type of professional is very confident in their knowledge and skills, they have to fall back on online documentation and need to chat with other professionals on a regular basis for day-to-day tasks. The sheer complexity and variety of IT systems make it highly unlikely that at any moment you have all required knowledge on board. He needs a “Just-in-Time delivery” of key knowledge items to be able to perform his job.

When we look at the certainty level of this typical IT worker, we will notice that whereas certainty about theoretical knowledge might be lacking, most show strong metabeliefs in the sense of confidence in their network. On top of this, these skilled professionals often have a good awareness about the limits and reach of their own knowledge, so that they know precisely when to ask help or to revert to documentation.

Case 2: epo-test

When today a Lab performs an epo-test, there is no longer individual certainty of the researcher or lab assistant involved. The test is done by calibrated, complex machinery following strict procedures. An
individual can no longer oversee the complex lab setup, let alone that he would have sufficient scientific knowledge to understand all the detailed processes involved. These not only have to do with biochemistry, but also with electronics and programming.

This means that the knowledge that is produced by a lab expertise has primarily to do with a fallback on procedures, the calibration of instruments, the certification of Lab procedures. Often, these procedures grow out of scientific publications produced by the lab, where the used methodology is discussed and offered for scrutiny in peer reviewed journals. It is clear a lab can be a part of a scientific knowledge producing chain due to very high level social organization.

So, while we can safely say the lab assistant “knows” the result, however, the assistant fails the traditional benchmark for knowledge, since he has no individual certainty. He has good reasons for his belief, but the complexity of the evidence buildup is such that we can no longer say that it is this subjective relation to the facts from the researcher is his decisive contribution to it being knowledge.

The lab environment enforces the knowledge claim, it provides the enabling conditions. This also means a Lab result can be contested: on procedures, on calibration issues, on certification problems etc. Again, we see an example where the sheer complexity of how knowledge comes about through deep social organization has an impact of how we assess the knowledge of the contributing individuals.

Case 3: Family doctor

Visits to a Family doctor have so dramatically changed through internet impact, that there is something uncanny about it. Take the case of a little girl that visits the family doctor with her grandfather. Statistical data show us that an average family doctor in the Leuven area has about 30 munities for each patient, and a couple of hours a week spare time to do some further research. When we compare this with the time availability at the patient’s side, a totally different picture emerges, at least in modern western societies. The grandfather might be a retired aeronautics engineer, highly educated and deeply interested in science. Of course, he has a broadband internet access at home, and should have found out already long ago about PubMed, the giant public medical database.

As a typical stakeholder, who is likely to have a keen and intrinsic interest in the health and well-being of his grandchild, it would come as a surprise if he wouldn’t have used PubMed or similar internet resources to study his grandchild’s illness. This often leads to very difficult situations, where the family doctor has difficulties in convincing the much better prepared patient environment that a certain treatment is to be preferred. Today, many study programmes focusing on family doctors take this situation into account and train the physician to cope with these kinds of situations.

The bottom line is that the patient side has more brainpower/time resources available than the doctor and has ample access to information. The social context is to the disadvantage of the family doctor, whose authority is challenged.

A modern approach will try to use and exploit the patient side in the knowledge strategy towards addressing the disease, while stressing the family doctor’s information validation skills and responsibility therein. The doctor should have more persuasive skills, more insights in sound methodological reasoning and skilled diagnostic techniques, and maybe less readily available knowledge about cures, pharmacology etc, since this can be retrieved from professional networks when needed. Again, the mass availability of information on the internet, combined with the scarcity of time at the doctor’s side, forces us to alter our expectations towards the kind of knowledge a family doctor has to have to be able to perform duly.

Case 4: CEO presents annual balance

In many cases, social expectations towards knowledge claims have legal implications. This is because a lot of interests depend on a particular information. A typical case is the annual balance of a company.
The CEO is legally bound to communicate a truthful annual balance. Investors base their judgment on it, and they would feel duped if the information is not accurate. Once we deal with sufficiently large companies, however, it is easy to see that the complexity of accounting goes far beyond the personal cognitive powers of the CEO. In many cases, the accounting depends on very complex software processing tens of thousands of transactions.

So, for the CEO there is a lot of trust involved, in his collaborators and his organization. State-of-the-Art, and special legislation like Sarbanes-Oxley, urges the CEO to follow trust-enhancing procedures. This can mean hiring qualified accountancy personnel; selecting certified software; ordering timely, independent external audits. This way, the certainty with which the CEO can claim his annual balance reflects reality will increase to a socially accepted level. Should there still be a problem, it is important that the CEO can show that he has followed proper standards of conduct in assuring his information was right. The CEO cannot hide from his responsibility to know what is considered to be within reasonable reach.

Can we ever say that the CEO “knows” - in the classical epistemological meaning of the term – that his balance is right? In many cases we will be forced to admit this is a strong claim. He did not see all lines of code; he did not compute every transaction. But yet, legally, he should know, he must know!

Again, we have an example where the complexity of the information at hand – an accountancy of a large company is something quite challenging – is at odds with our requirements and our classical conception of knowledge as something involving individual certitude.

What happened?

In the four cases, today’s availability of information and its inherent complexity defy our traditional conceptions about what one should and can know. The individual often can’t cope any longer on his own to make a justifiable knowledge judgment. The justification of a “justified true belief” is no longer a personal venture but is accounted for in a complex and opaque social network. Knowledge workers are acting in a trusted environment, with a lot of safeguards for the details that escape their own scrutiny. This leads to new requirements being set out for what is socially accepted as knowledge. A professional knowledge work has to comply with a partly implicit, but growingly explicit set of “rules of engagement” that will define whether he operates at the safe side of socially accepted knowledge.

This does not mean, by the way, that we would adhere to our feel the need for a relativistic account of knowledge. Quite the contrary. We are only arguing that if we were to assess someone’s knowledge, we would quickly end up unraveling a vast social network, tied together by procedures and constraints.

This poses some challenges for education. To educate people to become knowledge workers, they need to develop these social-cognitive skills. One of them is knowing how to build a solid social framework in which to operate. In the case of an IT-professional, he/she will find forums, websites, services etc. on the internet which prove to be reliable sources of information. Building certainty about the degree of reliability of these sources will be necessary to be able to perform as a professional, as one cannot hold all relevant knowledge by oneself.

(e-)Learning should support these requirements and address these challenges. It should train people to hand off certain knowledge domains to other professionals, while at the same time keeping check that they are “up to spec”. I trust my system engineer because I know he regularly takes refresher courses and engages positively with colleagues who do the same job elsewhere. I can assess the validity of his decisions and actions without being forced to know the details of his business myself. Learning how to build these trustworthy relationships should be a central part of E-Learning. Precisely because normally these skills are not taught through the regular curricular course content, but explained by teachers and learned from fellow students and co-workers through informal learning. This means that in a distance
teaching environment, where these beneficial contextual settings are not available, one should make an effort to translate these hints into documented materials.

**From information to knowledge**

Internet is often seen as a tool for easy distribution of information. It has been compared with the introduction of print and its impact. It solves the distribution problem, and has often been hailed as a major achievement in the democratization of information.

Availability is no longer the problem; retrieval and assessment are.

Yet, Information is not the same as knowledge (Dretske 1999, Floridi 2005).

More so, the concept of knowledge itself comes under strain due to the information age (Schiltz e.a. 2007).

The knowledge reach is related to our activities, and the required granularity to support our actions
We do not all need the same depth of knowledge on a specific topic (Kripke 1980)
Social organization helps to make available the knowledge we need when we need it.

**Knowledge in a social network**

An ever increasing percentage of our knowledge is about our own creations, like artifacts and concepts (e.g. organisational psychology studies abstract concepts like “job satisfaction” etc.).

These concepts gain their meaning from the social context. Knowledge is related to human action.

“If a lion could speak, we could not understand him.” (Wittgenstein, PI, p.223)

In a knowledge economy, there is a sharing of responsibility for knowledge: we will devise our professional labour in such a way that the necessary knowledge comes about, is maintained and is kept in a sustainable way. To be able to focus on our own work, we will defer knowledge to experts (Kripke 1980), accepting their judgment, while we often do not even have the possibility to challenge the veracity ourselves. There is little real-life knowledge without trust.

Of course one has to have reasonable grounds to accept something from a known expert (Burge 1979).
This all leads to a participative knowledge model, where stakeholders share responsibilities in knowledge advancement. Whereas testimony is a crucial part of knowledge acquisition (Burge 1993), we often go further and develop procedures to solidify these trust-relationships, to make them traceable and allowing for them to be challenged when necessary.

Internet technologies facilitate a further externalisation of knowledge (Clarck & Chalmers 1998). On a macro level, knowledge is stored in external memory, in a way it can be easily linked to other knowledge items and can be retrieved with minimal effort. (Bush 1945). But knowledge also translates into organisations, into structures. It gets consolidated into artifacts, is integrated into software.

On a micro level, we weave our personal knowledge trail on our portable, mobile, iPod, PDA, ...

Goldman calls this the socialization of knowledge (Goldman 1999). What we know is what others accept that we know, we are entrusted with knowledge. The more we know, the more our environment becomes knower-friendly. This acculturation of our environment means that we are gradually operating in a more and more knowledgeable, intelligible domain.
Knowledge is passed on from experts to stakeholder communities, where it is merged with practice to yield more concrete, specific knowledge. This way, a knowledge development circle emerges where at one time one acts as an expert, at another one uses other experts’ insights as a professional.

**Just-in-Time delivery**

The true revolution in the knowledge economy can be compared with the evolution in logistics and transport. We are heading to Just-in-time delivery of knowledge, or “Knowledge on Demand”. This is becoming a necessity, given the sheer amount of available knowledge, and the knowledge that is necessary to perform ever more complex tasks. It is just not realistic that a system engineer has all the knowledge he needs readily in mind: he is tremendously helped by fast searchable information on the internet. This information not only consists of factual knowledge but also helps in decision making processes.

**Different structure of knowledge**

Contemporary professional knowledge integrates the time dimension: to know means also to know the validity and applicability of what one knows. Rather than being a list of static descriptions, today’s knowledge rather is a continuous task of fine-tuning knowledge-paths. A good deal of knowledge in organizations is project-centered and disappears into oblivion once it is no longer needed. An increasing part of knowledge is industrially produced in research, in such a systematic way that we can predict when we will have access to specific knowledge. On the other end of the spectrum, the internet is helping out stakeholder communities to consolidate their more artisanal knowledge into the public domain. More and more, “Guarantees” for knowledge claims are required, and certification and self-certification help to build trust in new knowledge domains.

Knowledge is multifaceted and fine-meshed, which is sometimes misunderstood in a relativistic way. Each “community of practice” develops a proper language registry to grasp its activity domain. These intricate overlapping realms of meaning give a rich variety to what is to be known. What would the richness of the world of ideas be without the depth of human activity?

Each will decide the depth and width of the particular understanding he needs to develop in a layered knowing society. Knowledge actors are no longer only people, but also groups, organizations, artifacts, machines or software, e.g. bots.

**Impact on (e)Learning**

Knowledge becomes a personal journey in a social environment (think about E-Portfolio). For a growing part, learning involves reaching out to the network of stakeholders, it means getting accepted in the circle of “those in the know”. It also requires taking responsibility for knowing. The knowledge worker will focus on a specific knowledge domain, and take on the task of follow-up. He will prove to his co-workers that they can trust him to do so, that they can rely on the fact that he/she masters this subdomain, so that they can focus on other parts of the relevant knowledge domain. The knowledge worker will try to prove his worth by showing his track record, by following refresher course, by being an active member on relevant websites, blogs or forums. Typically, a knowledge worker will engage in a “Track while Scan” activity. In a wide sweep, we keep track on a whole range of adjacent knowledge fields, without going into details: we trust others to do so.

Depending on the need, we will engage specific details in depth, and we learn others to trust we are doing so.

**Knowledge workers**
Knowledge workers and researchers introduce themselves in a « community of practice » (Wenger ...), and increasingly tend to mix private and professional knowledge development. Knowledge workers will try to gain authority, earn the respect of their co-workers for their knowledge. They want to be referred to when it concerns statements in their knowledge domain. They will also scrutinize which fellow-workers they deem fit to join their knowledge effort, to be part of an inner circle.

A knowledge worker needs to have good situational awareness of the knowledge network. He will feel responsible for a particular knowledge domain. He weaves his personal web of knowledge, often on his laptop and other mobile devices.

To Know is to Learn

Informal learning is a continuous, unalienable state. We learn as we work, interact with others, engage in professional activities. Formal learning only accounts for a part of our learning activities. In the networked world, internet-technologies are helping us to keep trace of the informal learning that takes place. It helps in storing information in an accessible way during our activities. It helps us to bookmark information, to tag it, to share it with others. The fact that all this is digital provides the opportunity to develop tools to exploit this information and to make applications that really enhance someone’s “active memory”.

The learner needs to build on specific meta-cognitive skills that will help him to clearly understand where the boundaries lay of his own responsibilities and what can be given safely in a “hand-off” to others. This can be lateral, higher or lower in the knowledge chain.

Ethical dimension of knowledge

Learning becomes getting involved in a reference-community in a reliable way. It involves taking and granting responsibility. There is an imperative to mutual quality assessment and control. One will always have to assess, at the boundaries of one’s own core competence domain, how “loosely” one is allowed to know things to be able to perform in a professional way. This is the fundamental ethical dimension of knowledge: there is no knowledge without accountability, without a knowledge claim.

Conclusion

Knowledge-oriented e-learning is something quite different from just using online tools to complete a cognitive task. It also is quite more than a layer of social skills over a cognitive learning path.

On the contrary, it is essentially a set of cognitive competencies, understood from within the social context which is the learning network.

The ethics of knowledge is the foundation of any sustainable (e-)learning strategy.

Bibliography

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