The Aeffability of Knowledge Management [1]

The challenge of knowledge management, and hence of online learning, is to make it work with the complexity and richness of actual human communication.

By Stephen Downes

The Autism of Knowledge Management

Patrick Lambe is concerned about the "obsessive fascination with the idea of knowledge as content, as object, and as manipulable artefact" (Lambe, 2002) that he feels is manifest by certain proponents of "object oriented knowledge and learning management". This fascination, he suggests, stems from an artificial separation between content and connectivity. It manifests a "disregard for the unique contexts" in which meaning is constructed. Knowledge, when viewed as an object, is separated from the context in which it may be applied, as instantiated by human interactions.

Lambe's thesis is bolstered with observations and criticisms regarding the origin of this view. Knowledge management along with associated technologies, such as the use of learning objects, have their origin in a desire to automate and industrialize the process of teaching and learning. Quoting Yates, he depicts the process as a depersonalization of content, the removal of "individual idiosyncrasy ... memory ... and skills" with systemic, organization-based, analogues. (Yates, 1989). The result, he argues, is "a view of the organization as a machine" and knowledge, therefore, as objects manipulated by that machine.

It is hard to resist this comparison. Writers about knowledge management and learning objects explicitly use the terminology associated with industrialization. Lambe quotes Gibbons, et.al. (2002), "The instructional object -- indexed by metadata -- has great potential as a common building block ...." As Friesen (2003) notes, diagrams depicting the model of learning objects used by such agencies as Advanced Distributed Learning actually contain pictures of gears. The criticism, "That there is a qualitative difference between the process of steelmaking and learning as a human experience laden as it is with emotive colouring, and nested in an intricate, ever-changing web of relationships, is not noticed, or it is ignored," is oft-repeated throughout Lambe's essay.

"Our point here is not a moral one, however, but a logical one. Approaching the use, acquisition, creation and adaptation of knowledge as if it is primarily a mechanical

exercise that manipulates and processes stuff, akin to a blast furnace, is a category mistake. The analogies don't wash, because knowledge itself does not behave like physical stuff, and we only partially behave around knowledge as if it is stuff. The word "knowledge" is a noun, only because we make it so, not because it is a thing to be manhandled."

It is on this observation that his argument will stand or fall.

Objects, Reusability and Universality

Philosopher Gilbert Ryle (1949) coined the term "category mistake" in order to refute the thesis that there is a distinction between mind and matter. Searching for "mind", argued Ryle, is akin to searching for "school spirit" and expecting it to be found somewhere among the buildings, grounds and students at a university. School spirit, like mind, does not have a separate existence, and it is thus inappropriate to treat it as though it did. School spirit is rather, as some later writers would say, an emergent (or "supervenient") phenomenon arising from the interactions of students among themselves.

Lambe's argument, then, is that knowledge management and learning object designers are treating knowledge as though it were like the bricks and mortar of a university. But knowledge, he responds, is more like school spirit. Though it may depend on the arrangements and behaviours of various physical objects, such as people or states of affairs in the world, it is not the same as them. Knowledge, rather, is more like school spirit, and (marketers aside) the idea that you could capture, package and distribute school spirit is absurd.

Indeed, one of the major ways an emergent phenomenon differs from a physical object, as Lambe recognizes, is that it needs to be recognized in order to exist. The pixels arranged on a computer screen are physical objects; that together they form an image of my cat is an emergent phenomenon. But the pixels can be said to form an image of my cat only if there is a perceiver to recognize them as such. The property of "being a picture of my cat" is not inherent in the pixels, not even in the organization of the pixels. Recognition of the emergent property as such requires a host of background assumptions: that there are cats, that they have certain distinct appearances, that this picture resembles my cat, of which I have had prior experiences.

Thus Lambe writes, "All learning has context, and it has historicity. In both dimensions, in its context and its historicity, knowledge is imbued with meaning and emotion far beyond its informational content, and it is netted in a social understanding of the world. It is layered in time, overlaid, often obscured and sometimes revived and resurfaced, to take

on fresh shades of significance. It has a past and a future. It means different things to different people. Knowledge as we use it is organic and contiguous to our existence as continuous, conscious and social identities."

The bulk of Lambe's paper is devoted to exploring particular ways in which knowledge does not resemble physical objects, and specifically, the idea that knowledge (and hence, a learning object) is reusable, the idea that it can be used anywhere, the idea that one bit of knowledge can be exchanged for another. These are properties that various writers have found to be essential to learning objects. Friesen (2001), for example, writes that learning (or educational) objects must be discoverable, interoperable and modular, which together allow them to be reusable and interchangeable.

But knowledge is not reusable, argues Lambe. Even physical objects are not reusable, except at a "skin deep" level. The attraction we have for an orange jump suit obtained from NASA, for example, may be very different from the attraction we have for an orange jump suit from a prison compound. Only one of these would be worth wearing around the house, and this selection depends on our recognition of the history and meaning of the one over the other.

Nor is knowledge universally applicable. While a given brick may be used in any wall at any time, the applicability of knowledge is much more limited. Knowing how to drive on a freeway, knowing how to interpret Morse code: these are bits of knowledge that are more or less usable over time. The usability of a given bit of knowledge also varies according to place. "Our knowledge needs differ depending on who, where and when we are." What we need to know varies from domain to domain. "There is no such thing as universally applicable knowledge, and this is why the market for the localisation of instruction manuals, software and e-learning has blossomed in recent years."

In the same way, and by the same reasoning, bits of knowledge are not interchangeable. While it may be possible to remove one brick and replace it with another, it is not possible to do the same with knowledge. Understanding how to fix a photocopier, for example, depends on the unique circumstances of the given machine, and so knowledge about one machine cannot be applied to the diagnosis and repair of another machine. "Understanding the science and being able to label and replace components does little to resolve problems that arise from social and human initiatives and changes."

Applying Knowledge

There is much that is true in Lambe's observations, and this gives his overall argument a plausibility and intuitive acceptability. It is true, for example, that knowledge is an

emergent phenomenon; there aren't bits of knowledge out in the world that can be harvested like apples and beans. Just as seeing a picture on a computer screen requires that a perceiver detect, and recognize, a pattern of pixels, so also does knowledge require that a knower look at the world, detect, and recognize a pattern of phenomena.

The history of knowledge is replete with debates regarding how a knower, or a community of knowers, can detect such patterns, what will count as a pattern, whether a pattern is genuine or merely a spurious observation, whether the pattern represents (or is) an underlying reality. But nobody -- not even Lambe, if he would reflect on this -- believes that the knowledge we thus obtain is not reusable. The very act of it being knowledge, the very fact of being a pattern, makes it in one way or another abstract, and if something is abstracted, even a little, then it can be applied to two or more unique circumstances, and is therefore reusable.

Consider one bit of knowledge, the knowledge that "2+2=4". This is a pattern that can be extracted by observing the behaviour of groups of objects in the world. (Kitcher, 1983) As it turns out, it is a part of a wider, inter-related set of patterns we refer to in the aggregate as "addition" or "mathematics". The usefulness of mathematics is derived from its wide applicability. It turns out that every time we aggregate two objects, and conjoin them with a similar aggregation of two objects, the result is four objects. This particular principle is used in a wide range of domains, from engineering to economics to baseball. The knowledge that "2+2=4" is most definitely reusable; indeed, it would be of little interest to us (much less denoted a type of "knowledge") were it not.

The knowledge that 2+2=4 is also interchangeable. Because there are many bits of knowledge (by definition, an infinite number of bits) and because no human (save, perhaps, someone who is autistic) can remember them all, these knowledge bits are codified and stored in various devices. In my youth they were encoded on bits of paper in tables called "addition tables" and "multiplication tables". More complex calculations are encoded on a device in my office called a slide rule. When I went to college in 1980 I obtained my first electronic encoding, a calculator. Today such devices are common and we see in stores everywhere both mechanical and electronic storage devices called cash registers. Now the key point (and the reason I expend such effort on this list) is that it doesn't matter which of these devices we use. One encoding of 2+2=4 is exactly the same as another, which is why we did not revise the laws of mathematics when we replaced abaci with calculators.

Reusability abounds. In Lambe's own example, the manufacture of orange jump suits is probably centralized. The government most likely obtains them en masse, sending some to NASA and sending some to the prison system. Until individual markings are added at

their final destination, they are essentially indistinguishable and interchangeable. Most physical objects are like this. When I buy a pencil, it does not matter much which particular pencil I buy, so long as it is of a certain type (orange, 2H). I select these, and many other objects, by their general properties. I apply a pattern to my selection, and so long as an object matches that pattern, it (or any other one like it) will do.

It is true, as Lambe observes, that not all knowledge is applicable in all circumstances. My knowledge that 2+2=4 would not be of much help when using a roadmap to find the city of Paris. Nor does it assist (much) in the care and feeding of my cats. My authorship of this paper does not depend on the knowledge that 2+2=4, though as an example I may mention the item from time to time. The same holds true for objects. If I wish to fly from Paris to London, I would use an airplane, not a pencil. If, by some unfortunate mistake, a contractor received a Buick instead of a brick, he would send it back rather than attach it to the exterior of the Undergraduate Hall. Knowledge is applicable to domains, domains are defined by a context of use, and a specification of the context makes it clear what sorts of objects are applicable and what sorts of objects are not.

Lambe's argument cannot be that knowledge is not reusable, for such a position is absurd. Lambe's position must, therefore, reduce to the proposition that only humans can recognize when one bit of knowledge, rather than another, is appropriate in a given circumstance. Cash registers require cashiers, he might argue. And the recognition that the knowledge that 2+2=4 rather than, say, "Paris is the capital of France" is a recognition of such a type that only a human can make the call. If everything rests on, as Lambe says, "the overriding primacy of local context for the applicability of knowledge and learning," then it must be shown that at least some part of this context is irreducibly human.

Completeness and Liberation

Suppose we had only two items of knowledge in the world, "2+2=4" and "Paris is the capital of France". Suppose, additionally, we had a limited set of descriptions of contexts in which one of the two facts is required. How could we decide which item of knowledge to apply? We would want to know whether the context is a mathematical context, or a geographical context. We recognize these by abstracting for salient features of each context. If, for example, we detect a preponderance of numbers, we infer that we are in a mathematical context, and apply "2+2=4". Otherwise, we infer that we are in a geographical context.

In other words, we know which knowledge to apply to a given context because we recognize the context. This recognition is based on one of two possible sets of criteria: either properties inherent to the piece of knowledge itself, or properties inherent to prior

contexts in which the knowledge was successfully applied. [2] Either way, the salient properties are in some way abstracted, codified, and compared to similar properties abstracted from the present context. If there is a sufficiently strong match, then the item of knowledge may be (with reasonable confidence) successfully applied.

In arguing against the possibility of applying knowledge (or learning objects) to particular contexts, Lambe must show that there is some part of this mechanism that cannot be automated, that there is some part of this mechanism that requires, in an irreducible fashion, human intervention. Lambe presents the argument in two ways: first, he suggests that there are some aspects of the description of the context that cannot be codified and transmitted; and second, he argues that there is no system of codification that could do the job. If we are unable to identify and compare the salient properties, obviously, no process of recognition can occur, and we must depend on a human, who has inherent powers of recognition, to make the match.

Lambe argues for the first of these propositions by suggesting that the necessary description of a knowledge item cannot be complete, in other words, that in the codification and transmission of knowledge, some aspect of that knowledge is lost, and that we therefore lack the means to apply it appropriately in a given circumstance. In particular, what cannot be codified and transmitted is human experience: "Technology-mediated knowledge management is incomplete, unless it links us back into the physical, sensual, emotion-laden world we inhabit." A given taste, smell, emotion or feel is unique to a given human and cannot be abstracted and transmitted, and yet is necessary for the transmission of knowledge from one person to the other.

Lambe adduces several examples in order to illustrate this point, of which the case of learning how to cook wah kueh is the most plausible (and the most extended). To learn how to cook wah kueh one would, in normal circumstances, obtain a recipe. By following the instructions in the recipe, the theory goes, one can acquire the same knowledge as the person who wrote the recipe. However, essential to learning a recipe is the capacity to get the taste right. This is something that could not be encoded in the recipe, nor would it be reflected in the description of either the original context or the new context. The only way to know whether one has learned is to apply the recipe and taste the result, comparing this experience personally with the original. Writes Lambe, "We don't truly know until we have internalised, integrated into larger maps of what we know, practised, repeated, made myriad variations of mistake, built up our own personalised patterns of perception and experience."

The variability of human experience comes into play with respect to the second proposition. Even supposing that we could, in some way, codify all that was necessary in

order to recognize when knowledge has been successfully applied to a given learning context, there is no language that could represent this codification. For in order to arrive at such a codification, we would require a language, and in that language, an ontology and vocabulary shared by both the learning provider and the learner. "It must be widely agreed, and there must be common definitions with common meanings," argues Lambe. But "Very little of real working life is run on agreed, common definitions."

Such a language will fail, argues Lambe, for four major reasons. First, the world cannot be objectively described in a stable way to everyone's satisfaction. Second, subjective variations cannot be moderated. Third, the world will change faster than our capacity to describe it. And fourth, most of us will simply not understand the terminology. If any of these four factors comes into play, the ideal of an objective language collapses, and hence we have no means of recognizing when an item of knowledge (or a learning object) can be appropriately applied to a given situation.

Moreover, even if, by fiat, we could dictate *a priori* a standardized language, such an effort would be doomed. It would lock us into a particular way of seeing the world, unable to respond to change. "In what way is the rigid application of standards for e-learning and knowledge management in our current state of awareness any different from a committee being formed in the Mainz of 1460 to legislate on the form, dimensions, specifications and design of the printed book for the purposes of proper housing and retrieval in libraries?"

Descriptions and Language

Lambe's arguments are compelling because they appeal to things we know to be true. The taste of wah kueh is distinct from the recipe. The viewing of the Mona Lisa in person is distinct from the viewing of a replication. Our experiences are personal, and because our view of the world, and hence, our way of describing the world, depends on experience, our descriptions are personal. When I say, "wah kueh has a dry taste with a hint of rice flavour" the sensation I am describing may be very different from the sensation you imagine. That our experience, backgrounds, and beliefs vary one to another is evident in the differences between movie reviews, differences in favorite foods, and differences in religion.

That there can be no universal public language is, in my mind, indisputable. There is substantial argumentation in philosophical literature to show that a given ontology, and hence, a given semantics, is applicable only within a limited domain. This is why I argue (Downes, 2003a) that we do not want "one standard for all." But I also argue that we do not need it. A language (and hence, an ontology and a semantics) can be limited to a

specific domain. This is, in fact, what happens as nations, religions and professions adopt their own vocabulary.

What Lambe needs to show is two-fold: first, that some phenomena are ineffable, and second, that these phenomena are essential constituents of knowledge, that is, that there is no domain (however small) in which a given item of knowledge can be applied to more than one specific instance. We can easily grant the first. Otto (1923), for example, describes religious experience as ineffable. Nagel (1974) describes perceptual experience as ineffable. It is not possible to grant the second, however.

It is not possible because the object of our enquiry is knowledge, not experience. The two are very different things. One -- experience -- is like the pixel. It is concrete. It is situated in space and time. It has certain inherent properties, some of which may be ineffable. One might say that a perceptual experience is like a pixel (or many pixels, depending on your theory of mind) in the brain. Knowledge is not like that. Knowledge is, as we discussed above, an emergent phenomenon. It consists not of the pixels themselves, but as an abstraction of those pixels. Knowledge, by Lambe's own argument, is exactly NOT the sort of thing that can be ineffable.

Any item of knowledge, no matter how precisely defined, no matter how domain and context specific, is an abstraction. Because it is an abstraction, the specific physical manifestation of that knowledge is NOT a part of the knowledge itself, but only a part of the instance of that knowledge. And if the physical manifestation is not a part of the knowledge itself, it follows that knowledge may be transmitted from one location to another, from one physical manifestation to another, without loss.

Lambe's thesis is, at its heart, implausible. If, in order to be knowledge, something required a specific manifestation (as, say, a certain perceptual experience), then it would not be possible -- ever -- to pass knowledge from one person to another. It would be not merely difficult, but impossible, to learn how to (say) mix an Old Fashioned from a drink recipe book alone; the inventor of the Old Fashioned would have to confirm, in person, no less, that the feat had been accomplished. Mathematics could never be taught without the aid of pebbles (or sheep, or whatever the originator actually used). Geography could be learned only through travel. And we know this isn't true; we know that none of it is true.

Deliverance

There is on the part of many writers a desire to attach something personal to common areas of human endeavour, and especially, to the practice of teaching and learning. This

desire has intensified in the digital age as we see more and more of these endeavours migrating from the physical world to the non-physical. Thus we read writers such as Dreyfus (2001) warn that, in cyberspace, we might "lose our ability to distinguish relevant from irrelevant information, lack a sense of the seriousness of success and failure necessary for learning, lose our sense of being causally embedded in the world and, along with it, our sense of reality, and, finally, be tempted to avoid the risk of genuine commitment, and so lose our sense of what is significant or meaningful in our lives."

In pedagogy there is a general principle, that it is better to experience the truth of something than to be told the truth of something. And so also, in acquiring knowledge, it is better to taste, to touch, to feel -- to gain the sensations that accompany a given bit of knowledge -- than it is merely to receive the knowledge in its abstract form. On receiving the abstract, the description, the emergent bit of a phenomenon, we need to in some way produce a concrete instance of it in our minds, in order to associate it with other experience and memories. Just as a data stream requires a computer screen in order to become an image of a cat, so also must we instantiate new knowledge in our mental pixels.

As I wrote last year (Downes, 2002), while it is true that we need experiences in order to learn, "We are at all times connected to our body, at all times amassing and assessing a constant flow of sensory input. Even when we are watching television or surfing the Internet, the body's productions continue endlessly. The data we collect from the video terminal forms only one part and arguably even a small part of the experience of the moment." What the critics of knowledge management, of learning objects, of online communication, miss is that it need not be the SAME experience as that had by the sender.

This is a good thing. For otherwise, communication and education of any sort, and not merely of the distance or online variety, would be impossible. For even in the most personal of settings, even in the classroom or the one-on-one tutorial, there is no magic mind-to-mind transfer of perceptual experience. There is always a gulf, always a need for abstraction from experience, always a language (whether it be a written language, body language or visual language) into which this abstraction must be codified, always a medium through which it must be transmitted. The very essences of knowledge and communication lie in abstraction.

Lambe's argument, in the end, must appeal to some sort of mysterious mind-to-mind communication. "The least interesting thing about knowledge flowing down wires, printed on pages, painted on screens, or transmitted via communication signals, is how the signals are constituted and sequenced. Much more interesting is the complicity and

sympathy of numerous brains acting in concert at the level of protocol (agreeing how to communicate, and knowing which genres to deploy when), while simultaneously pursuing and propagating variety and discord at the level of interpretation, constantly creating fresh, relevant, transient knowledge out of the balletic dance and traffic of our more enduring but essentially static knowledge artefacts."

But it's just not so. The phenomenon of "numerous brains acting in concert" and the "balletic dance" are, in fact, complex sets of communicative activities occurring between humans, often expressed in very high level abstractions (a shrug, a smile, a seductive shuffle of the feet) in order to communicate, from one person to another, an emotion, a desire, a suggestion.

The Challenge Before Us

Human beings, when they communicate, are a veritable fountain of artefacts. We leave behind a trail of physical phenomena -- words, songs, gestures, images, scents, touches -- through which our ideas and knowledge are communicated one to the other. Very often, our communicative behaviour consists not in the knowledge itself. We do not actually send abstractions of perceptual experiences. Rather, much of our communication consists of signs or representations of the phenomena being described. If I use the word "cat" my intent is not to make a short, guttural noise, but to stimulate in you an abstract representation similar to the one that was present in my mind prior to my uttering the word. This presupposes some commonality of intent and meaning, a commonality so pervasive that some authors (such as Fodor, 1975) suggest that it must be innate.

The challenge of knowledge management, and hence of online learning, therefore consists in this: of being able to capture those artefacts, of being able to recognize the salient features of the context of transmission, of being able to store them in digital form, and of being able to recognize new contexts in which the same transmission would be of value. Though this sounds daunting, it has already been accomplished in simple form; the trick is to make it work with the complexity and richness of actual human communication.

That we HAVE made it work is evident from the fact that I can learn from Socrates. "Know thyself," the ancient philosopher famously said (presumably in Greek, and not King James English), and through a process of capture and transmission this important bit of knowledge was stored and transmitted to me via a book, was read, and has become part of my perceptual landscape. So we have made it work. But to make it work, we need to capture those useful bits of Socrates's monologues, such as "know thyself," and not those useless bits, such as "this drink is bitter." But how? I would suggest the following:

* ***Knowledge must be captured.*** This requires the creation and storage of those artefacts that contain knowledge, and importantly, the distinction between those that do and those that do not. (Subsidiary: the discipline of knowledge management is essentially the discipline of recognizing those artefacts in everyday communication, while the discipline of instructional design is essentially the discipline of creating those artefacts specifically for this purpose).

* ***Knowledge management systems must match the knowledge to the context.*** In a very narrow context, more concrete knowledge is appropriate, while in less well defined contexts, more abstract knowledge is appropriate.

* ***Knowledge management systems must determine, and use, the language of the user.*** Sending English instruction to a francophone is inappropriate; so is sending management-speak to an engineer.

* ***Knowledge management systems must embed emergent phenomena in physical instances,*** and hence, must provide some means through which the user can recognize the knowledge in the message. This may require the embodiment of the same knowledge in multiple forms and multiple modalities.

* ***Knowledge must be instantiated as an experience in the user.*** This involves the creation (through, say, practice) of matching perceptual states in the user.

* ***Knowledge management systems must not be static:*** they must recognize changing knowledge, changing circumstances and changing languages.

I think that, in the main, the people working with knowledge management systems and with learning objects recognize that they are working with artefacts, not bits of knowledge itself. But they also recognize that the purpose of a knowledge object or a learning object is to provide a temporary physical medium in which the knowledge itself, which is an emergent property, can be transported from one person to another.

It is a difficult, tedious and often painstaking process. But it is no miracle. Human knowledge is ALREADY embedded in non-human physical form in the words, writings, behaviours and other artefacts created by people in the course of day-to-day discourse. This knowledge CAN be recognized mechanically, because the conventions used to encode the knowledge in the artefacts are PUBLIC conventions. And they CAN be transmitted to new listeners because the very same artefacts were intended to be used in precisely this way.

Far from being autistic, knowledge management and learning object specialists are probably among the most socially minded of all professionals. And hence, we see in closer examination, not the autism of knowledge management, but the affability of it.

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Footnotes

[1] The term "aeffability" is intended as an opposite to the word "autism" and is an amalgam of the words "effability" and "affability". It is pronounced "ee - fa - bil - ity". That I could invent and make clear a word such as this partially supports the thesis I offer in this paper.

[2] It has been argued -- I believe successfully -- that the properties required for successful recognition are in many cases (if not most cases) not inherent in the item itself. This is why in previous articles (such as "Learning Objects in a Wider Context" I argue that the codification of these properties, expressed as metadata, should describe the environment in which the object was used, and not merely the object itself. See Downes (2003).

Further Reading

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