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COMMUNITY NOTE

Is it actually possible to measure knowledge sharing?

Louise Clark[a]* and Sarah Cummings[b]*

[a]Independent consultant; [b]IKM Emergent/Context, international cooperation

This Community Note describes the discussion around the question 'Is it actually possible to measure knowledge sharing?' which took place on the emailing list of KM4Dev in the summer of 2010. This led to an active discussion with some 76 responses covering a wide range of topics: knowledge sharing and behavioural change, complexity theory, subjectivity and possible indicators, before arriving at reflection on the very nature and value of scientific exploration. Participants were members of the KM4Dev community and were largely knowledge management practitioners in development.

I have to say – I am loving this discussion thread and every day eagerly open my hotmail in anticipation of what new interesting stuff I get to read about. (Posted by Amina Singh on 16 August 2010)

Introduction

In the summer of 2010, Stefano Barale made a post to the KM4Dev discussion group (www.km4dev.org) asking 'Is it actually possible to measure knowledge sharing?' This question stimulated an animated discussion with 76 responses from members of the community who were keen to share their experiences and perspectives.

This Community Note synthesizes the themes identified in this conversation and draws out some of the key lessons that emerged. The conversation started with a discussion of tools and approaches and developed into multiple threads that explored complexity theory, subjectivity and possible indicators before arriving at reflection on the very nature and value of scientific exploration. The full, currently unedited version of this discussion is available on the KM4Dev wiki.[1]

The original question

The original question (posted on 10 August 2010) focused on how traditional tools such as questionnaires, interviews and expeditions could be made more rigorous to show whether online knowledge repositories actually support knowledge sharing, using indicators related to shared authorship and updating of documents as well as frequency of access and number of citations to other documents in the organisational knowledge base.

Until today I've seen various tools used by most KM practitioners to try to reply to the very basic question in a KM assessment exercise: where does this organisation stand in terms of KMS? The tools I've seen are:

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*Corresponding author. Email: lounatclark@gmail.com; sc@developmenttraining.org

- questionnaires (manual, to be distributed to a wide statistical sample)
- questionnaires (web-based such as the IBM-Inquira tool, with automatic stats displayed at the end, to be filled by the largest number of employees)
- knowledge expeditions
- interviews

These tools are surely good, but I was looking for something as much 'scientific' as possible; something that could help us define KS [knowledge sharing] well as speed, mass and position (over time) define the motion of a body in classical mechanics. Some indexes capable of replying to the question: 'what makes a knowledge organisation different from the others?' These indicators (indexes) should tell me that the organisation is actually sharing knowledge. . . or not. Here you find my tentative list:

- number of co-authored documents (indicating good collaboration) compared with total documents produced, in particular if the authors come from different departments of the organisation (indicating good cross-departmental collaboration);
- frequency of updates to documents present in the knowledge base of the organisation (indicating good learning after, i.e. knowledge capture);
- frequency of accesses to the organisation knowledge base (indicating good learning before);
- number of references (links) to other documents that are saved in the organisation knowledge-base, per document (indicating again good level of collaboration in terms of learning from experience). (Posted by Stefano Barale on 10 August 2010)

The post stimulated an animated discussion with numerous responses that were quick to point out that sharing knowledge does not occur though the uploading and downloading of documents but rather it is how knowledge is used and whether its application leads to concrete development results that we need to capture:

Wow. You've hit the nail on the head. The problem for me however is that your list defines either the vehicles within which knowledge is packaged, or the frequency with which the objects are picked up and opened, and then later referenced. But none of them tell you about the two most important questions:

(1) Did the person who has that new knowledge change any decision, change any action, or rethink any conceptual framework or approach BASED on that new knowledge? And if so,
(2) Did it make a difference in terms of an end DEVELOPMENT result? (Posted by Tony Pryor on 10 August 2010)

This highlights the lack of clarity between knowledge as a product or output that we can count, and the behaviour change resulting from application of new knowledge which is a process and therefore much harder to measure. This ambiguity is exacerbated by our need for rigour, also mentioned by Tony Pryor in the same post, which is usually associated with quantitative methods, forcing us into a corner of counting knowledge products.

Stefano then confessed that he had been playing devil's advocate with the original suggestion of indicators but challenged the group to think about whether and how the output indicators which we are able to measure could be used as proxy measures for behavioural change resulting from access and use of new knowledge, and provide us with an entry point into measuring outcomes:

Let me start by admitting that I posed a 'naive' question on purpose. In fact, I personally think that the reply to the question on top of my message is 'Obviously NO! :-) Still, as you point out, there are some indicators, some indexes, that may help us understand what's happening under the surface of the deep waters of organisational knowledge. Maybe we'll have to accept

that we'll never know the position of our 'knowledge item', while travelling the space of common knowledge, but this doesn't mean that knowing its 'probability function' may not be interesting for our purposes. And, indeed, I think it is. Let me then restate the problem in a less naive way. The scope of establishing this indexes is not really to measure the level of knowledge sharing but, less ambitiously, to see if the organisation has the right environment for knowledge sharing to happen. . . .

The responses explored various aspects of behavioural change; it is not just about knowing more but using the knowledge to do things differently. Another important point is that behaviour change has both positive and negative dimensions so we need to be clear on the wider context of this change to assess how specific behaviours bring us closer to our desired development goals – or the even more elusive concept of social change. As Charles Dhewa noted:

Maybe we need to look at both sides of behaviour change and put more effort on how knowledge sharing can reinforce positive behaviour change. (Posted on 26 August 2010)

We were reminded that systematic approaches for measuring behavioural change do exist; ethnographic and anthropological research have rich traditions of using activity metrics, but the challenge is not so much gathering this data but knowing how to use it. Thus, we not only need to think about the data we need to collect to prove our contribution to behaviour change but what we plan to do with the data and how we aggregate indicators to turn data into compelling evidence.

Knowledge sharing environments

Another discussion thread emerged which moved away from focusing on specific knowledge products to a wider focus of assessing the environment that supports knowledge sharing in organisational contexts. As knowledge management (KM) practitioners, members of KM4Dev are aware of the symbiotic relationship through which informal channels support official databases or intranets to enable knowledge sharing, with one comment noting how making visible the knowledge held by people was the 'most important' element of the repository, not the documents themselves. From this perspective, the key question becomes how to create professional environments that are conducive to knowledge exchange, combining formal technological solutions with social spaces that encourage discussions and exchange. We should be thinking about what this environment might look like and the conditions that help staff to make the best use of the knowledge available to them. Answers to these questions might give us an insight both into how to create such an environment and what its effects on the outcomes of projects and organisational performance might be. There are factors that facilitate our abilities to use knowledge to do things differently than we did before, for example practical experience, teamwork, motivation, peer exchange. We should also be aware that there are factors that restrict our ability to use knowledge, such as bullying, lack of teamwork, lack of motivation, lack of trust, vanities and competition." Moreover, people need information that is available to them at the right time in suitable formats, as well as access to skills training to learn from people who have overcome the challenges and problems they currently face. One comment in this thread challenged us to be clear about whether our unit of measurement is the individual or the organisation, which has clear implications for how we measure the efficacy of our professional environments to promote knowledge sharing. Another asked us to consider whether we actually need to bother to try and measure the social change from KM. Is our concern with measuring an artificial concept from the development sector that leads us to chase our tails? What can we learn from the private sector companies, Google, Facebook,

and Twitter, who have changed the way we work and think and measure their success in terms of revenue?

Products-processes/outputs-outcomes/tangibles-intangibles

This self critique of the development sector's obsession with measurement challenges us to enter into evaluation parlance and explore the well-known development dilemmas of whether to focus on products or processes, outputs or outcomes – questions that promote discussion and debate across the entire sector, and are by no means restricted to knowledge management and sharing. We need to embrace the fact that the most valuable lessons are often found, not in what we can measure but what we can't. Another way of thinking about this is exploring tangible vs. intangibles which roughly transposes onto the outputs/outcomes question:

> The value is in the intangibles generated as a result of the interactions. I call these intangibles the outcomes (as opposed to the tangible outputs). They tend to be things like increased levels of knowledge, a greater capacity to innovate, the capability to create more ideas, relationships, trust and active networks (like this one – why do you contribute to this forum, can you measure it?) (Posted by Arthur Shelley on 23 August 2010)

That said, we cannot entirely reject the importance of measuring and counting tangibles, as they are likely to also be central elements of our implementation plans and activities. A nice analogy was used of a man searching for his lost keys:

> There is a well-known fable of a man who drops his keys in the dark part of the street but searches under a streetlight because that is where the light is. If we want to examine the impact of KM programmes we can't just focus on the things that are easy to measure. (Matt Moore, 19 August 2010)

Beyond this outputs-outcome/tangible-intangible debate, our greater challenge is to gauge whether we have made any lasting impact and made a real difference to people's lives:

> In order for the intangibles to have real value they must eventually translate into tangible benefits as well (unless we are interested in supporting knowledge for knowledge sake). It may be very difficult to measure the 'ripple effect' of long term benefits derived from these intangibles, but in order for KM to be properly valued and supported by decision makers surely we must try to do so. (Posted by Eric Mullerbeck on 26 August 2010)

So another entry point is to consider the anticipated outcomes of knowledge sharing; we share information with a purpose so we need to provide evidence that the information we share is fit for purpose and supports the desired outcomes.

Complexity and causality – shooting at butterflies

Another theme throughout the discussions was the issue of complexity and how to determine causality when we can't necessarily identify all the complex factors at work. Both the Cynefin framework and Outcome Mapping were suggested as resources that could help us to manoeuvre our way around this complexity. Despite the increasing popularity of these tools and approaches many of us are still shooting at butterflies.

> This debate is a fascinating one, and to my mind, it really hinges on your underlying theory of change and the implications for knowledge.

> If you think the world is predictable, simple, linear, then measurement of knowledge sharing will be entirely possible. Look no further than Henry Ford and scientific management for the appropriate tools, based on metrics and targets.

> If you think the world is complex, interconnected, dynamic and emergent, then measurement of knowledge may be akin to using a machine gun to catch a butterfly. For sure, there can be retrospective learning, narratives, sensemaking. . . (Posted by Ben Ramalingam on 16 August 2010)

Indeed, several posts captured the frustration of our own inability to move beyond linear mechanisms to measure our work. We promote complexity theory and explore emergence of social processes to support learning, however:

> Paradoxically, the majority of our effort still goes on over-designed, top-down systems which have an overly mechanistic view of human beings, how they interact and how they learn. (Posted by Ben Ramalingam on 16 August 2010)

Thus there is an inherent tension between embracing complexity as knowledge professionals and meeting the results and reporting requirements of donors and senior managers, creating a temptation to simplify the complexity in order to satisfying this thirst for answers. Can we find the middle ground between the complex and the linear?

Towards a formula or framework

We cannot afford to ignore the question of accountability and the need for evidence which means it is time for some radical out-of-the-box thinking to identify a framework to bring these different elements of our experience together. The following formula was suggested by Damas Ogwe on 20 August and gives us food for thought about how we actually address our need for evidence in complex intangible questions such as improvement in quality of life, farm productivity and food security/insecurity levels, ability to innovate and adapt to different situations and circumstances, and the ever-elusive change in perceptions, thoughts and ideas.

Measurement could be argued out in the following equation:

$$PI + CI = (K2 + R2) - (K1 + R1)$$

Where
PI = Personal Impact after sharing
CI = Community Impact after sharing
K1 = Knowledge before sharing
K2 = Knowledge after sharing
R1 = Resource utilization before sharing
R2 = Resource utilization after sharing

Thus the difference between the sum of knowledge (K2) and resource use after (R2) knowledge sharing on one hand and the summation of knowledge (K1) and resource use before (R1) Knowledge sharing on the other can help us understand both personal (PI)and community impact (CI).

This suggestion certainly captured our collective imagination and led to another intense exchange over whether the minus should in fact be a plus:

> I think that's an interesting equation that you present here. I am wondering about the "–" in it . . . what if this "–" were a "+" ? (Posted by Christina Merl on 22 August 2010)

The answer is of course that that would depend upon the context. In some cases, new knowledge must be built upon existing knowledge and experience, while in others it will replace previous ways of doing things. Knowledge is constantly being lost and that is something that we rarely acknowledge and certainly don't know how to measure. But the very essence of knowledge makes it so hard to capture in this type of equation; it is something that flows rather than a fixed asset. So we need to identify mechanisms to measure knowledge as an asset that can be accumulated (and depreciated) whilst also exploring the flows and exchanges that support these processes. As Damas Ogwe replied on 23 August:

> Though many thesis [sic] have been advanced in measuring KS, I for one would be sceptical about adopting any single formula as the standard through which to measure the success of KS both quantitatively. KS is one ingredient that can spur real development especially at the grassroots where resources are in plenty but which are unutilised or misused especially in the developing world.
>
> Thus when we try to measure KS, we may look at key specific anticipations from the sharing. The following are just three examples of information/knowledge sharing (though they may appear out of context) and their expected outcomes:
>
> i- KS on Malaria prevention/treatment – fewer malaria related deaths, recording of number of malaria cases in a given area or uptake in the sue of mosquito nets.
>
> iii KS on HIV/AIDS prevention – look at the increase in the use of condoms, reduction in pre-marital/youth pregnancies, increase in number of persons wanting to know their HIV status etc.
>
> iv KS on fighting the striga weed – increased maize/corn, increased use of striga weed resistant maize seed varieties etc.
>
> iv Sharing on girl child rights – reduction in child labour, increased girl child enrolments in schools etc.
>
> Thus whenever information is shared, there is a purpose. 'Have these purposes been achieved?' is the key question that we have to address a few months or years down the road. We may not be able to clearly measure exactness or specificity of success or failure, but we might just be able to gauge whether we have succeeded through KS or not.

Putting lessons into perspective

An essential piece of this puzzle is accepting that what works in one context or situation is not necessarily suitable or advisable in another, so we need to embrace both the complex and context-specific nature of our work and be prepared to adapt to our circumstances. As we were reminded in an impassioned argument against 'best practice,' we have no idea of the criteria or review process by which some practices were decided to be the better than other, highlighting our inherent subjectivity:

> And now for my pet peeves re 'best practice':
>
> • Both words are seldom defined: what is a 'practice'? And is the thing called a practice easy to hold, or in fact so complex that it's hard to see where it stops and starts (Cynefin helps on this point);

- What makes something 'best'? I think we like the term because it gives us confidence consciously or unconsciously that someone somewhere reviewed one practice against another based on the input of experts, and reviewed them against some yardstick of quality. And not only was some sort of yardstick used, and used wisely, but that it led to a 'winner'.
- In most instances, what makes the practice not necessarily the 'best' is not that it is complex (as Cynefin defines it) but because there was no yardstick used, and no 'expert' process involved in carrying out the comparison.
- Often what is seen as a best practice is more like a 'practice that I heard about which seems to be pretty good'. Now that isn't a BAD thing, and in fact is probably as good as one can get to quickly. The problem is that by calling it a 'best practice' we tend to strip from that practice any contextual concerns or issues which in fact probably made the practice of interest to begin with.
- And last but not least, we often study a practice without having an understanding of its life cycle. If you're promoting the planting of on-farm trees with the hope of having increased Household income from fruit or other produce, calling something a 'best practice' in year 3 seems a tad premature. This is compounded by the tendency to track, evaluate and comment on interventions while we are funding them, whereas many impacts occur after (sometimes long after) external support ends. The ex post evaluations and reviews that look at final impact and THEN declare something a best practice often gets overwhelmed by a deep-seated concern over tracking how our money is getting used, or misused. (Posted by Tony Pryor on 16 August 2010)

As James J. Tarrant responded:

> Originally, the concept of 'best practice' came from the engineering world and was usually codified in a 'code of practice'. . . The problem is that this kind of standardisation can work well in engineering situations: bridge building, building construction, etc. but break down pretty quickly in most social science kinds of situations, e.g. anthropology, economics, sociology where even the desired result may be subject to dispute or at least different interpretation. (Posted on 17 August 2010)

We need to step back and question whether we recognize subjectivity and its influence in our work enough. We are generally aware of the many divergent and incoherent views and perspectives that different stakeholders have of a development situation, but are less conscious of our own perceptions and how they influence us in our efforts to extract solid lessons from our experiences that have value for others. From this perspective, it is extremely difficult to determine what constitutes a lesson or a valid point of view so we need to start thinking more critically about lessons and encourage more than one interpretation of how lessons from a project or experience emerged and their potential applications for other contexts and projects:

> Juliana notes that 'as humans, we all have our own perceptions and biases' and is looking for how to minimise those and extract lessons from an intervention that can become valid/solid evidence to inform a new program or project. While I agree with learning and using that learning I worry about minimising subjectivity, because all you can do is minimise the recognition that it is there, and I think part of the problem is that we don't recognise subjectivity enough.

> Although in science experiments can result in evidence, I have found this principle difficult to apply in development. How to deal with the many subjective, divergent and incoherent views and perspectives that different stakeholders have of a situation is something which underpins our approach to development. You can use your power (perhaps as donor or editor) to decide which view is valid, you could apply selective hearing to select evidence, but I have yet to see any rigorous scientific approach to determining what is a lesson or a valid point of view. As part of the IKM Emergent work on the ripples of participatory processes [Beardon and Newman

2009] in iNGOs [international non-governmental organisations], I have been reflecting on the process whereby people's views, stories, perspectives etc are turned into evidence and data, and how a blind eye is turned to manipulation and exploitation within iNGOs. For example, where 'voices of the poor' are selected to support a campaign message or tactic, rather than the campaign really being built on and deal transparently with the complexity which is inevitably reflected in the divergent voices or intricate stories which come out of grassroots participatory processes.

This might sound a bit abstract or irrelevant to planning for improved lessons learned, and the need to build in systematic capturing and sharing of lessons learned is very real (I have recently used reporting templates to support this but of course it depends on the context). But instead of trying to minimise subjectivity, I would like to see more appreciation and recognition of that, to encourage people to think critically about the lessons, how they emerged and what can be learned from them for other contexts and projects, if possible encouraging more than one interpretation of lessons from a project or experience. Because lessons, like stories of change and definitions of a better society, are subjective and may tell as much about the teller as about the experience they describe. (Posted by Hannah Beardon on 16 August 2010)

As knowledge management professionals we should be more aware than anyone of the dynamic interactions between multiple knowledges in the development process and we need to move beyond our obsession with tools and methods to focus on the synergy of different types of knowledge, each with their own measurement logic. We work with a range of evidence and it is the sharing of patterns across these approaches which builds up the rich picture of change, leading to collective learning and action:

> if you add 1. individuals' knowledge and 2. creative ideas to the mix, and accept that uncertainty and ignorance are legitimate parts of the knowledge system, and stir the mix then amazing synergies follow.

> The secret lies in how you stir the mix – almost every email in this discussion offers a measure connected to a tool for change. If you move the measurement focus from the tool to changes in the suite of knowledges you get a rich picture that everyone can share.

> Each of the knowledges has its own measurement logic. Taken together, individuals' self reports, community groups' stories, experts' objective measures and organisations' performance indicators, on any action on a shared issue bring a rich picture of any change (or lack of change), Sharing the pattern of the change leads to collective learning among all the actors - and enables collective action. (posted by Valerie Brown on 27 August 2010)

So maybe we should try to find better mechanisms to align the juxtaposition in our thinking between local and scientific knowledge? We know that statistical knowledge can be manipulated but this doesn't reduce its perceived value and we favour this type of evidence as it requires proof and is therefore associated with rigor. Although local knowledge and community experience is about interpretations and perceptions, this knowledge is equally valid when it comes to decision making so we need to find better mechanisms to incorporate local knowledge into decision making processes. By putting different types of knowledge on a more equal footing, we can combine elements and learn from each other to develop solutions to common problems.

This line of thinking led to reflection on the very nature of scientific enquiry:

> For science advancement, disproving hypotheses is the engine, but for professional life, disproving assumptions is the engine. We advance when we uncover and disprove the assumptions we were using when making sense of our work or designing strategies. We should not oppose local and scientific knowledge. More than ever we will need good science to understand the emerging global problems. (Posted by Sebastiao Mendonça Ferreira 31 August 2010)

Science is about challenging accepted truths; doubt and questions are usually the precursor for a paradigm change. This conversation highlighted the level of doubt and questions around how we measure the impacts of our knowledge sharing activities and suggests the time is right for a shift in our thinking. We need creative, out-of-the-box thinking that combines qualitative and quantitative parameters, captures tangible and intangible outcomes and enables exploration of lessons from multiple perspectives. As Margarita Salas wrote on 27 August 2010:

> There is no objective truth, because even data collection is formulated based on a specific paradigm and interpreted within that paradigm. Establishing that a specific knowledge paradigm is inferior to another has the danger of being just another form of colonialism. Local knowledge is useful when it tends to the needs and problems of the community, not when it is recognized as truth by others.
>
> From a knowledge sharing perspective, the value of sharing experiences is precisely to create a dialogue around the different types of knowledge people and communities have. But this is only possible if one truly respects the other person's knowledge as valid as one's own knowledge. One thing is to have differences in opinion, another very different to judge as inferior a specific world vision. Science, as we know it, is just that, a specific world vision, that if you think about the complete history of humankind, has really been around for a very short time.

Continuing the conversation

The Knowledge Management Impact Challenge (see http://kdid.org/kmic) aims to continue the exploration of this topic by gathering and exchanging stories of what works and what doesn't. It also features a growing collection of recommended resources in the online library – to which new contributions are encouraged. The challenge is an initiative of the Knowledge-Driven Microenterprise Development (KDMD) project of the US Agency for International Development.

Note

1. Available at: http://dgroups.org/ViewDiscussion.aspx?c=038278af-a7cd-4c4e-bed0-ac8ea0b7b57f&i=74a38330-cfef-4af3-a864-eaa59b9b742a

Notes on contributors

Louise Clark has worked on communications, knowledge management and monitoring and evaluation in the natural resources sector across Latin America and Sub-Saharan Africa, with a particular emphasis on understanding social networks to increase transparency of information flows and give a voice to the rural poor. She has a PhD in rural sociology from the University of London and is at her happiest in the field working with farmers. She is currently working as an independent consultant supporting the USAID funded Knowledge Management Impact Challenge to improve shared learning around how to measure the effects of our investments in knowledge sharing and learning.

Sarah Cummings is a consultant, knowledge management at Context, international cooperation in the Netherlands. She undertakes research as part of the IKM Emergent Research Programme, under the auspices of the European Association of Development Research and Training Institutes (EADI). She has worked in the field of information and knowledge for development for more than 25 years.

Further reading

Below is the list of resources that were suggested throughout the discussion.

Books and book chapters

DiBella, A. (2001). *Learning practices – assessment and action for organisational improvement*. Upper Saddle River: FT Press.

Kitching, G., 2008. *The trouble with theory: the educational cost of post-modernism*. University Park: Penn State University Press.

Brown, V.A., Harris, J.A. and Russell, J.Y., 2010. *Tackling wicked problems through the transdisciplinary imagination*. London: Earthscan.

Davenport, T., 2005. *Thinking for a living: how to get better performance and results from knowledge workers*. Cambridge, MA: Harvard Business Press.

Articles, working papers and manuals

Beardon, H. and Newman, K., 2009. How wide are the ripples? IKM Emergent Working paper No. 7. Bonn: Information and Knowledge Management (IKM) Emergent Research Programme, European Association of Development Research and Training Institutes (EADI). Available from: http://wiki.ikmemergent.net/index.php/File:IKMEmergent_Working_Paper_7_-_How_wide_are_the_ripples-final.pdf (Accessed 6 December 2010).

Kurtz, C.F. and Snowden, D.J., 2003. The new dynamics of strategy: sense-making in a complex and complicated world. *IBM Systems Journal*, 42 (3), 462.

Hugenholtz, N.I., de Croon, E.M., Smits, P.B., van Dijk, F.J. and Nieuwenhuijsen, K., 2008. Effectiveness of e-learning in continuing medical education for occupational physicians. *Occupational Medicine*, 58 (5), 370–372.

International Institute of Rural Reconstruction (IIRR), 1996. Recording and using indigenous knowledge: a manual. Silang: IIRR.

Snowden, D.J. and Boone, M., 2007. A leader's framework for decision-making. *Harvard Business Review*, November, pp. 69–76.

Web resources

Innotecture blog 3rd November 2008. Justifying Your Knowledge Management Programme.

Ramalingam, B. How can outcome mapping help strengthen knowledge and learning strategies? Presentation [online]. Available at: http://www.idrc.ca/en/ev-91687-201-1-DO_TOPIC.html [Accessed 17 February 2010].

APQC taxonomy model to identify key performance indicators http://www.apqc.org/knowledge-base/documents/apqc-process-classification-framework-pcf-cross-industry-pdf-version-510 [Accessed 6 December 2010].

Aid on the edge of chaos blog 13th August 2010 What brain scientists can tell us about learning in aid agencies. http://aidontheedge.info/2010/08/13/what-brain-scientists-can-tell-us-about-learning-in-aid-agencies/ [Accessed 17 February 2010].

Innotecture blog 3rd November 2008. Justifying Your Knowledge Management Programme. http://innotecture.wordpress.com/2008/11/03/justifying-your-knowledge-management-programme/ [Accessed 17 February 2010].

Ramalingam, Ben, Mitchell, John, Borton, John and Smart, Kristin. (2009). Counting what counts: performance and effectiveness in the humanitarian sector. http://www.alnap.org/pool/files/8rhach1.pdf [Accessed 17 February 2010].

Beth's Blog: How Nonprofit Organizations Can Use Social Media to Power Social Networks for Change, 19th October 2007. Podcamp Session on Social Media Metrics: Thank You Jeremiah. http://beth.typepad.com/beths_blog/2007/10/podcamp-session.html [Accessed 17 February 2010].

Post normal science http://en.wikipedia.org/wiki/Post-normal_science [Accessed 6 December 2010].

Chartered Institute of Personnel and Development, 2005. Who learns at work? [online]. Available from: http://www.cipd.co.uk/subjects/lrnanddev/general/learnatwk.htm [Accessed 6 December 2010].