Web 3.0: preparing our students for tomorrow's world. Part 2

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The 6th August 1991 was a significant day in the history of the internet, being the day when the World Wide Web became publicly available. There was no fanfare. Its creator, the now internationally known Tim Berners-Lee, posted a short summary of his *Information management: a proposal* a year earlier <www.w3.org/History/1989/proposal.html>, giving birth to a new technology that would fundamentally change the world as we would know it (Figure 1). He tells the story that this proposal had been received as being vague but exciting (Berners-Lee, 2009), yet this vaguely exciting idea is now shaping the very scope and nature of our human communications and interactions with information on the web.

Early adopters will recall the static HTML coding that powered these simple sites on the web. Now the web is everywhere, on our mobile devices, in cars, on planes, and even on our televisions. Communication is the pivotal factor, with flexibility and speed considered as essential requirements in our quest for interaction.

A decade into the 21st century and we are almost enraptured by our contemporary digital landscape, mapping and exploring various pathways for information discovery, complaining about *information overload*, and adopting new forms of *information curation* to manage our information needs.

So it is important for us to understand how this information landscape is affecting how we produce and consume information in the juggle to support our students to become what Michael Wesch (2009) dubbed as *knowledge-able*.

> *As we increasingly move toward an environment of instant and infinite information, it becomes less important for students to know, memorize, or recall information, and more important for them to be able to find, sort, analyze, share, discuss, critique, and create information.*
>
> Wesch (2009)

For our students the world of technology acts as a magnifier, and as teachers we can leverage the networked information environment in ways that will help them achieve the *knowledge-ability* of learning in a Web 3.0 world.

The web of *things*

The web is around us – literally. While Australia is rolling out the National Broadband Network, the world is rolling out the *web of things* that is formed from the data that we and our objects are generating. This new web is replacing the kind of web that is the usual the backbone of our search-and-publish style of information discovery. In this traditional approach, teacher librarians choose the best website evaluation criteria they can find for

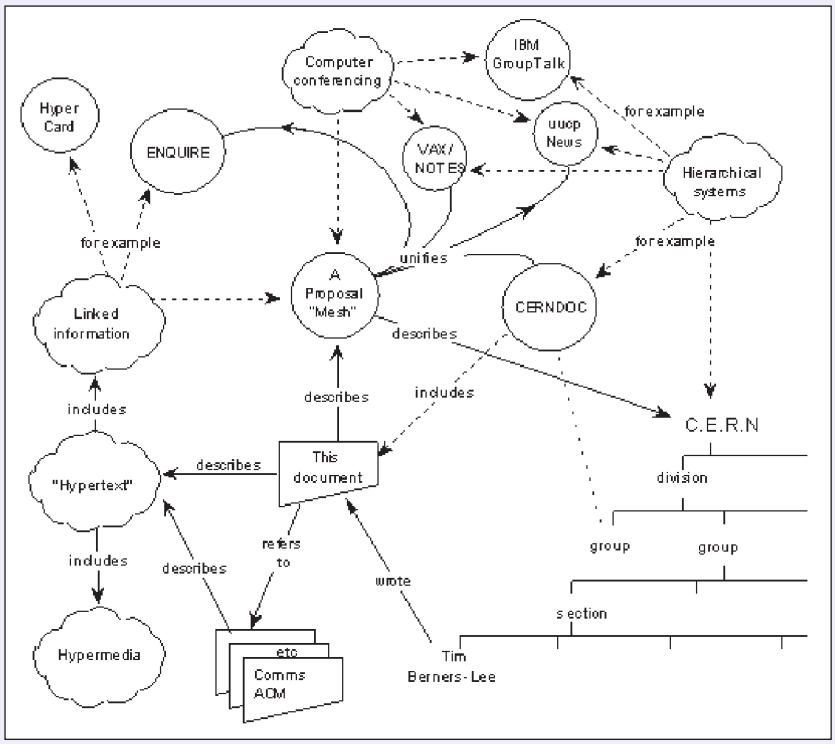


Figure 1 Berners-Lee's original information management proposal showing linked information systems <www.w3. org/History/1989/proposal.html>

their journey around the web. These are epitomised by clear evaluative strategies about educational, informational and technical issues related to accuracy, authority, objectivity, currency, coverage.

Yet Web 3.0 transcends this framework, leaving students and teachers working with a skill-set that reflects a less dynamic age of the internet. Today, a new approach to communication and information sharing emerges every time somebody creates a new web application or another falls by the wayside.

In Web 3.0, who we are, where we are, and what we do is as relevant as what we buy, what we read, what we research, and what we learn. There is a direct synergy that traditional web engagement overlooks, and signals the need to sharpen our approach in information literacy practices in such a hyper-connected world.

The social web and information

The *social* web not only enhances our opportunities for social networking, but also makes possible more powerful search, location, recommendation and similar services. This might help with your next outing, book selection, or gift purchase, but, conversely, it should be ringing alarm bells for information professionals when it comes to search.

Anyone who has an account with *Amazon* will be familiar with the recommendations that appear on screen when you log into your account, based on your previous purchase pattern. Anyone who is on *Facebook*, or has joined *Google+* will also have seen the *friend* recommendations generated by geographic and social connections (Figure 2). In our socially connected world, it is important not to sidestep understanding how the social web impacts the information seeking and learning needs of our students.

The ISTE NETS 2007 standards for global learning for students include

Figure 2 Photo by Limbic used under Creative Commons <www.flickr.com/photos/8230954@N04/3236511064/>

standards familiar to teacher librarians in relation to research, information fluency, critical thinking, problem solving and decision making. The standards also embrace creativity, innovation, communication, collaboration and technology. Most importantly the standards incorporate digital citizenship, emphasising that students need to:

a) advocate and practice safe, legal, and responsible use of information technology
b) exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity
c) demonstrate personal responsibility for lifelong learning
d) exhibit leadership for digital citizenship.

ISTE (2007)

More than just being an acceptable use policy, these elements of digital citizenship have to be woven into the very fabric of the social learning experiences of students.

Understanding the social web involves showing students how the social web impinges on our communication transactions, and affects our information gathering activities. The social web is affecting not only our digital footprint and digital identity, but is also very much affecting our information transactions.

In 2007, *Google* changed the default on one important aspect of its search service: automatic customisation of search results. This customisation now means that *Google* is delivering more results that fit your know locality, interests, and points of view, filtering information even before you have seen it (Vaidhayanthan, 2011). Most teachers and students do not realise that by being connected to *Google* through any one of its services, such as *Google Reader*, *Gmail*, or *Google+*, filtering is automatically happening. Just log out of all *Google* products on your computer, and run the same search through *Google* and see what happens. For another angle on the socialisation of information, revisit *Google Scholar*, and consider the implications around the citation counts that *Google Scholar* provides. What does this imply for peer review and scholarly aggregation of knowledge? After all, citation counts do not actually indicate importance. Do your students understand this? A high number of citations could indicate that an article may be foundational or, alternatively, that it is suspect and open to question. (Vaidhayanthan, 2011 p. 193).

We have all become quite accustomed to *Google's* quick and certain retrieval of information, with search options that seem to make us experts in receiving answers that seem suitable to our information need. Yet a searcher may not always be aware of what they are looking for, and an information query may seem to be resolved when it should have been expanded. A large part of what we do as information professionals is to ensure this does not happen. The internet has become part of our knowledge manipulation toolkit, as we facilitate discovery and interaction with information for learning.

Learning in the social web era is participatory, and involves communal approaches for distinguishing good knowledge sources from those that are

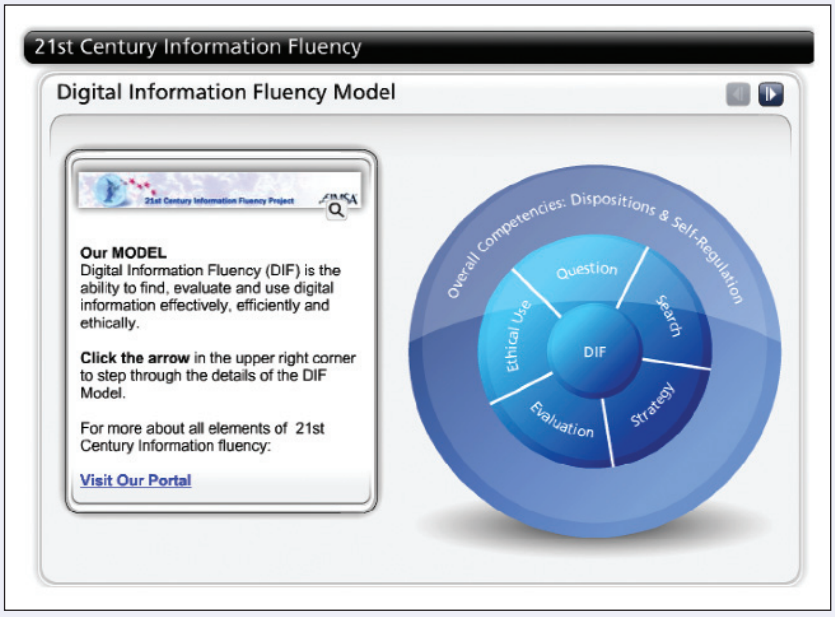


Figure 3 Digital information fluency model <21cif.com/resources/difcore/difv2%20-%20Engage%20output/engage.html>

questionable, using the web to share ideas, comment on one another's projects, and plan, design, implement, advance, or simply discuss practices, goals, and ideas together (Davidson & Goldberg, 2009). The firm establishment of the social web and participatory learning means that teacher librarians need to become more deeply immersed in social networking, as well as leveraging information architecture, interoperability, and strategies for finding information by utilising as wide a variety of social connections and search tools as possible to meet the information seeking training needs of their students (Figure 3).

Teacher librarians should make the social web a centre-piece around which information seekers engage in conversation about a topic. Social networking around skilled research is Web 3.0 at its best.

Explore *Knowledge 2.0* <bit.ly/knowledge2> and learn more about search skills and social web options for knowledge enquiry (Figure 4). Stay up-to-date with *All-in-one list of search engines* <www.pandia.com/powersearch/> which is always kept current, and *Search engines and search tools for kids and teenagers* <www.pandia.com/kids/index.html>. Keep in touch with search

Figure 4 Knowledge 2.0 QR code <bit.ly/knowledge2.qrcode>

developments and search engine optimisation (strategies that affect the ranking of search results) from the *Search engine detective* <www.pandia.com/searchworld/detective.html> and *Search engine land* <searchengineland.com/>.

The semantic web

Search engines are unable to index the vast world of high-quality content on the web, as much of it is *hidden* from the search bots that rove across the internet. One of the issues has been the dependence on keyword searches, based on chosen fields and/or metadata within a website. Now the semantic web is starting to connect data and information more closely, facilitating context based search and research.

The video created by Kate Ray on Web 3.0 reminds us that *the core problem is our ability to create information has far exceeded our ability to manage it* <www.vimeo.com/11529540>. In this video we are taken on a journey through data, media, news, social networking, searching, information filtering, indexing, artificial intelligence, and the context and debate around the semantic web.

While *Google* algorithms are busy finding information and organising the Web, the semantic web promises flexibility unheard of in the history of information organisation. The big theme of the semantic web is to make the web more understandable to software, whereas Web 2.0 has been about making the Web understandable to people.

The semantic web is an infrastructure technology built on data and metadata – a principle that librarians are already familiar with. Cataloguing has been all about getting control over content and making sure that the library catalogue facilitates discovery, management, identification and access to the library resources. But the semantic web future brings us a whole new dimension to our information organisation and access activities.

Coyle (2010) explains that the move toward an open declaration of vocabularies, and the freeing of data from databases and from records, is key to expanding the discovery and navigation services that we can provide to information seekers. Just as well!

While we make the shift in our libraries to new ways of managing the metadata in our school library catalogue with the move to RDA, take pause and think about the information deluge upon us, and appreciate the power behind the semantic web, which is giving meaning to a world of networked data. With the semantic web, *quick*, *brown* and *fox* are no longer strings of numbers to be manually combined, but are words that are formally represented concepts with defined relationships to other concepts. The ontologies that define these concepts establish meaning that can be understood by our search engines. They will also allow new interfaces, such as augmented reality applications, to combine with local and social web information to provide parallel cognitive enhancement in our information interactions (Yonk, 2011). The power in emerging technologies, from simple tools like QR codes to virtual and augmented reality tools, is ultimately being scaled by these.

So thanks to the *artificial intelligence* of *linked data* <linkeddata.org/> that is powering global data, web information can be aggregated and analysed to further refine and represent new information and new data. The LOD diagram (Figure 5) provides a snapshot of the 203 data sets which consist of over 25 billion RDF triples, which are interlinked by around 395 million RDF links (September 2010).

Back in 2006, Hans Rosling showed how the semantic web and linked data can be used in extraordinary ways. He took complex global trends and packaged them into lively animations, making decades of data pop <www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html>.

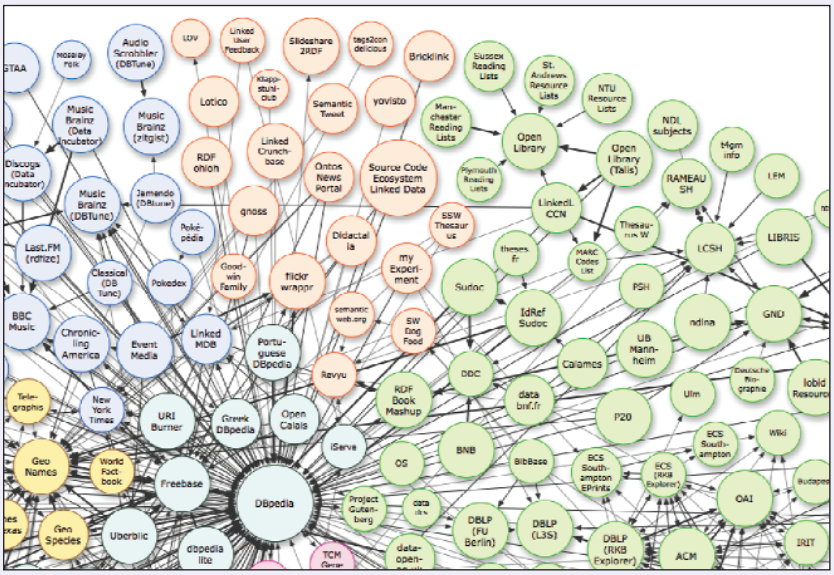


Figure 5 A section of the Linking Open Data (LOD) cloud diagram <richard.cyganiak.de/2007/10/lod/>

Since then, linked data has progressed worldwide. For example, *Mashup Australia* <mashupaustralia.org/data-sources/> explains that Australian government re-usable public datasets are available. There are now a growing number of these mashup initiatives creating new services, often with simple tools, and waiting for the energy and ingenuity of people and communities keen to solve a problem or create an opportunity.

Perhaps what we are seeing is the emergence of the web as a kind of content management system with data able to be repurposed from different sites, and published to new places and sites for further distribution.

Semantic search

Semantic search engines are continuing to evolve, and provide some insight into where future search will go. Built on the interactive power of Web 3.0, semantic search engines are emerging that perform an analysis of content in the search process. These search engines try to augment general searches as well as provide systems that are literally changing the search experience. Rather than simply identifying a useful page, these systems try to:

- pull the information from those pages that might be what a user is looking for and to make this immediately apparent
- supply specific sources for assertions in the content being provided
- help users identify further searches
- find matches between people and their needs
- provide *affective* aspects of the search query from the social web (Hendler, 2010).

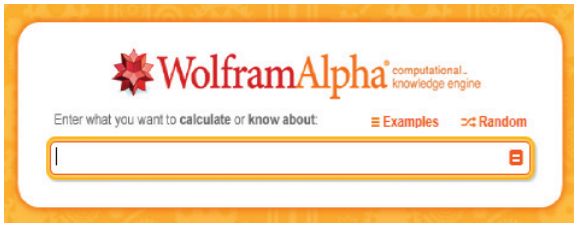
The variety of semantic search options being developed is as diverse as the data that they are mining (Table 1).

Implications for information professionals

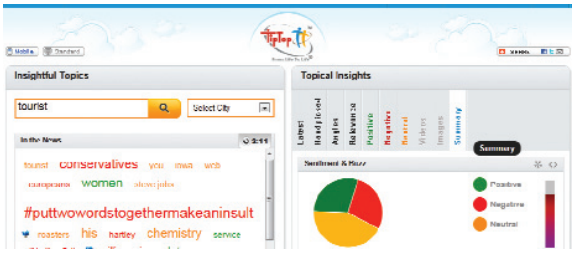
Educators need to be sure to include not just new search tools and strategies in the digital toolkit being introduced to students, but also be ready to build robust alternative search processes right into the core curriculum engagement processes wherever possible. The social dimensions of Web 3.0 and the semantic dimension of Web 3.0 provide a pivotal point in our engagement with global content and knowledge repositories.

Searching will continue to become an even stronger part of thinking and social networking, and our libraries as information spaces will need, more and more, to become knowledge spaces rather than spaces that are custodians of an inventoried collection. These information spaces should facilitate navigation to data anywhere, through linked-data initiatives, and be

Kngine <www.kngine.com/> tries to understand the documents and the search queries in order to provide customised meaningful search result, and now also includes *Kngine stats* <www.kngine.com/Stats/> and *Kngine explorer* <www.kngine.com/Explorer.ashx>.



WolframAlpha <www.wolframalpha.com> provides dynamic computations based on a vast collection of built-in data, algorithms, and methods. This search engine also provides the option to interact with your results using sliders and controls, to rotate and zoom 3D graphics and visualisations, and to manipulate results directly in your browser.



Tip top <feeltiptop.com/> allows a user to explore a complete new world of insights and sentiments from around the world, in real time.

Factbites <www.factbites.com/> offers you real, meaningful sentences that are right on topic.

Table 1 Examples of semantic search options

ready to re-package data with new connections in order to provide extraordinary opportunities for information and knowledge growth.

The social web will leverage the interconnectivity of resources, and facilitate conversation and mashup re-enforcing the importance of digital citizenship in online interactions. The Great NZ Mix and Mash competition, from the National Library Services to Schools, teaches students how to remix with respect, using Creative Commons, as the basis for creativity. As explained in the free educators guide, *the internet has dramatically changed quoting and remixing, largely because of the massive amount of digital content now accessible anywhere in the world, and the ease with which it can be copied.*

Web 3.0 and the semantic web have created a centre-piece around which information seekers constantly engage in creative conversation about a topic. Enter the *community as collection* model, where a school library becomes a practice-based, organic, distributive repository of conversations and information connections to local and web resources related to those conversations of learning.

Lankes, Sliverstein, Nicholson and Marshall (2007) explain that if knowledge is created through conversations, then libraries are in the business of conversations. They suggest that the power of conversation drives engagement and information distribution, as in the example of teens who want librarians to blog about book topics that interested them. Rather than looking at a catalogue, teens wanted to find what they were looking for in the context of a conversation. Now that our students easily turn to the web when posed with a challenge or learning problem – let us be sure our school libraries are central to their learning conversation. Web 3.0 provides a smarter and more efficient way to foster this kind of conversation. Tools such as *Scoop.it!* <www.scoop.it/> and *Storify* <storify.com/> are already enhancing social bookmarking and blogging as personalised information collections, such as *Digital citizenship in schools* (2011) and *Play School turns 45* (2011).

In *The atlas of newlLibrarianship, Lankes* (2011) asks us to abandon old ways of thinking and embrace the new world of openness, participation, technology and the promise of the semantic web, and urges us to learn to work with the internet in new ways as it traverses the seismic shifts of this decade.

Web 3.0 and the semantic web offer an online future with an intelligent web at its heart, with personalisation, virtual worlds and access everywhere. Our students have been surrounded by ever-evolving digital technologies and practices that impact on their daily existence and the textual landscapes that they occupy (Carrington, 2005).

Let us ensure that we are encouraging our students to be motivated searchers, creators, producers and consumers in digital, mobile-enabled environments. Let us centre our learning and teaching on preparing our students for tomorrow's world. ■

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