

professionals in Iran? If such a demand exists, who is responsible for preparing such professionals? Do you see any opportunity for US universities and the US e-learning industry in the e-learning development in Iran?

**VG:** I see e-learning as a new formation of existing sub-systems to make a new system. It means that the key building blocks of e-learning are available, but it needs a new architecture to be made (institutional issues in your model). So the most important necessity for fast development of e-learning in Iran is people who make the big picture (the managers in your model). The partnership with foreign universities and learning industry would be meaningful if they focus on the total system rather than sub-systems. Being meaningful they must fill gaps, not delete the existing local potentials.

**HH:** E-learning development in Iran is definitely dependent on providing expert human resources and instructors, and enough attention has not been paid to it. There have been initiatives in Iranian universities, yet there is a long way ahead. One of the best ways to fill the gap is to attain help based on the experiences of universities all over the world. □

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## Author Guidelines for Magazine Articles

In preparing an article for Educational Technology Magazine the primary fact to keep in mind is that this magazine is not a formal research journal. It is, as the name implies, a magazine. The Editors are looking generally for articles which interpret research and/or practical applications of scientific knowledge in education and training environments.

Thus, your article should not be cast in the form of a traditional research report. The facts of your research, or that of others, should be stated succinctly. Then you should go on to explain the implications of this research, how it can be applied in actual practice, and what suggestions can be made to school administrators, trainers, designers, and others.

The style of writing should be on the informal side—an essay—since once again this is a magazine and not a formal academic journal. Authors are free to state their opinions, as long as the opinions are clearly identified as such. The use of specialized jargon should be kept to a minimum, since this magazine has a very wide interdisciplinary audience.

There are no minimum and maximum length restrictions. Make your article as short as possible to do the job you intend. As a general rule, most articles are about 3,000 words. Include graphics as appropriate.

Note too that this magazine is read in more than 100 countries, by persons holding prominent and influential positions. They expect a very high level of discourse, and it is our goal to provide major articles of excellence and lasting significance.

# Point of View

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## The Curious Case of the Polio Virus Learn Node

Judy Breck

Why would my *Learn node: Polio virus invades from cell into the gut*<sup>i</sup> get 2,077 on-site views in the first eleven months of 2008, while the next most popular learn node in my collection, about Winston Churchill, got only 734 on-site views? The number of on-site views for my learn nodes drops rapidly after Churchill: lady bugs as green troops, 424, Zac the Rat teaches the letter “A,” 338, helmets that prevent brain damage, 327, meerkat facts, 291.

And would you not think that the general online public would be more interested in lady bugs and meerkats, surely—and Churchill, helmets, and phonics, probably—than a polio invasion of the gut?

The popularity of my polio virus learn node is even more curious when you realize that it is bundled inside of course materials and made up of slides, numbers 26 and 28, deep inside a PDF that is inside of course materials. The exact location of the curiously popular polio virus learn node is Johns Hopkins Bloomberg School of Public Health Open Courseware for course *550.630 Public Health Biology*.<sup>ii</sup> To reach it online, you need to go to that courseware and download *Module 2: Pathogens and Host Immunity*, open *Lecture 3: Pathogens: Nature and Transmission*<sup>iii</sup>—where the slides are inside.

### The Learn Node Method

My learn node project was put online in the fall of 2007. It operates from a WordPress blog titled *Learnodes.com*<sup>iv</sup> where I launch blog posts called *learn nodes* with the specific goal of driving Internet traffic to open educational resources (OER). The learn nodes posts are designed to be landing pages that will acquire Internet visitors who are searching online for the topic of the learn node. The goal is for these visitors to land on the learn node and then click through it to quality OER learning pages I have selected and linked out from the post.

We will return to the question of why my polio virus learn node received so many visitors compared to the dozens of other learn nodes I launched over the past year. First, a look at how well the learn node method works. Once visitors were attracted to the polio virus learn node, did they click

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through to the OER resources I had linked to the post? The answer is yes.

Of the 2,077 on-site visitors to the polio virus learn node, 330 clicked through to the Johns Hopkins Web page where the PDF could be downloaded to access the slides featured in the learn node. That is a very high click-through rate of almost 16%. The polio virus learn node also links to a Public Library of Science Biology article: *Imaging poliovirus entry in live cells*,<sup>v</sup> and to a *Virology Journal* article: *Epidemics to eradication: the modern history of poliomyelitis*.<sup>vi</sup> Those articles received 30 and 25 click-through, respectively.

In an October 2008 interview, responding to a question about mobile phone access to the Internet, Howard Rheingold described education dilemmas that learn nodes are geared to solve:

All of the world's knowledge is in the air to be plucked down by our telephone. Of course it's also all the world's disinformation, misinformation, spam, porn, Nigerian frauds, urban legends, hoaxes. So how do you find what you want and how do you know that it's true? Those seem like to me both extremely important questions today....<sup>vii</sup>

My learn node helped people find what they wanted. The placement of three prestigious sources together on the learn node helped them to know that they would be clicking into reputable—true, to use Rheingold's term—educational resources.

My polio virus learn node worked very well in attracting visitors to quality OER that satisfied their quest: Visitors came and a high percentage clicked through to the OER I had chosen for the topic. The learn node concept and the methods I used to attract visitors are borrowed from search engine optimization (SEO), now a series of fundamental tools for online commerce. A major thrust of the *Learnodes.com* project is to demonstrate that SEO can work for OER—that open educational resources can be optimized for search engines to attract visitors. In Rheingold's language again: SEO can help you find what you want and know that it's true.

Part of the curious fact that the polio virus learn node had so many visitors compared to my other learn node offerings is, I suspect, that I did the SEO better for the polio virus post. I must have stumbled on to keywords that made the learn node attractive. There was probably some social networking that helped. Educators are beginning to learn that they need to add SEO to their resources. I am among those who is working at understanding SEO and becoming more competent in practicing it.

## Unbundling

For a fuller look at this challenge, we need to notice that the tiny size of the polio virus learn node tells us something important about SEO. The most popular of my learn nodes, as noted above, is located way down inside a bundled course, and there it is no more than a couple of slides inside of a PDF. When I created the polio virus learn node, I copied the wonderful images on the slides and used them to illustrate the learn node post that I put online. In the text of the post, I made it possible to click to the PDF where the slides were, and explained how to locate the images within the PDF.

This willingness for online visitors to unbundle content requires an off-putting amount of effort, one would think. Not so. In a network environment, unbundling makes subject content nodes available on their own, and visitors like that.

Spontaneous unbundling is happening to many kinds of Internet content. An example from the hit TV show *Saturday Night Live* appeared in a post-Presidential election report, *TV Breaks Out of the Box*<sup>viii</sup> in the *Washington Post*:

When Tina Fey debuted her impression of Sarah Palin on "Saturday Night Live" last month, more people watched the comedy sketch online at NBC.com or Hulu.com than during the show's broadcast.

The television program received fewer viewers than a small segment of the program received online. The fact that viewers can select a node to watch from inside an entire television episode is a network structural fact likely to massively reconfigure the TV industry — as it is essentially all other analog content that has migrated online. Nicholas Carr, who in a chapter called "The Great Unbundling" in his book, *The Big Switch*,<sup>ix</sup> describes the effect on print publishers:

The publisher's goal is to make the entire package as attractive as possible to a broad set of readers and advertisers. The newspaper as a whole is what matters, and as a product it's worth more than the sum of its parts. When a newspaper moves online, the bundle falls apart. Readers don't flip through a mix of stories, advertisements, and other bits of content. They go directly to a particular story that interests them, often ignoring everything else.

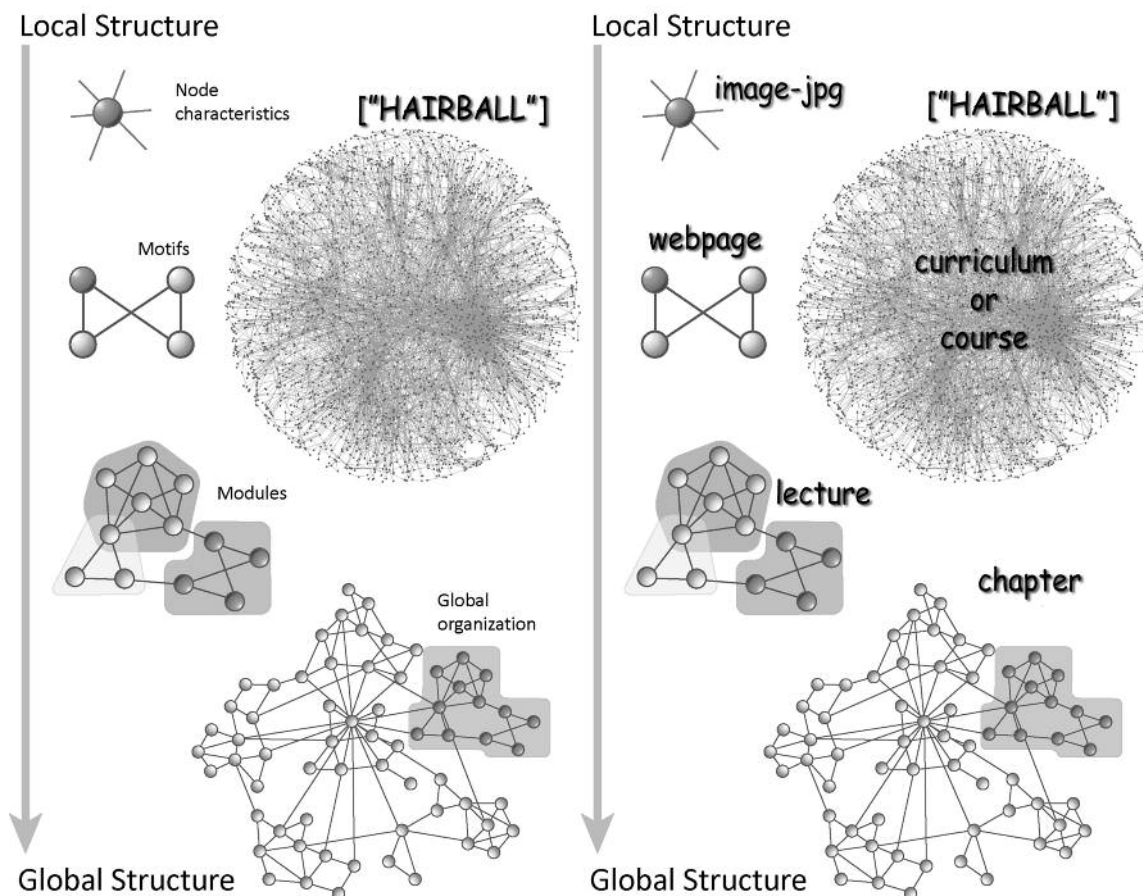
E-commerce is way ahead in the unbundled content game, letting online shoppers zip in a click or two to exactly the pair of sneakers or book they want. Education has not thought as much about unbundling its subject matter, too often leaving teachers and students to work from tightly bound courses, standards, or curricula.

## Hairball Structures

Although unbundling is a useful word to describe the way networks deal with packaged content from the analog past, the word *hairball* tells us more, as you can see in the structures illustrated in **Figure 1**. I found the word hairball used in a 2008 paper, *The art of community detection*<sup>x</sup> by Natali Gulbahce and Sune Lehmann, from the BarabasiLab.<sup>xi</sup> The illustration is adapted from that paper, and used with Ms. Gulbahce's permission. The left half of the graphic is from the article and illustrates "the scales of organization of complex networks...and shows how to breakdown the 'hairball' that arises when we plot the entire network." I have added the right half of the figure to indicate how different portions of a piece of OER might fit into the steps of the breakdown of its hairball.

In the view of network science, it is not at all curious that online visitors are inclined to burrow into a hairball to locate a specific node. A network hairball scales from local to global structure, providing structures between for content at every scale.

A course such as *Public Health Biology*, where the polio virus learn node is lodged, is an enormously useful link for someone who is teaching the subject, and often for students



**Figure 1.** Hairball and its scales of organization.

as well. Its potential online is greater still. Its course materials can become a rich hairball network: many of the components within the course will be useful OER for many others not needing all, or any other, of the course assets.

The term hairball is helpful in understanding and overcoming the usability problems of curricula materials when they are put online. Now that educators have had several years of experience—and a good deal of frustration—in attempting to shoehorn educational materials into the Internet, the explanation and guidance of the network breakdown chart are timely. OER placed online as a curriculum or a course creates a hairball that needs to be unbundled. The educational value of that hairball is increased exponentially by liberally identifying lower-scale parts with URLs, and providing search engine optimization at each of its scales: nodes, motifs, modules, and the community (hairball).

As to the reason my polio virus learn node received so many visitors: The truth is that we do not know—yet. As educators, we should be curious enough about what is happening to our content on the Internet to make finding out and using what we learn a top priority. If Nike can send you to a specific shoe in a couple of clicks, and Amazon present you in a nanosecond with six books you covet instantly, we can figure out how to send students with equal facility to the right places to educate them well. Be curious about how to do that. □

## Notes

- <sup>i</sup> <http://www.learnodes.com/2007/09/03/polio-virion-released-into-the-gut/>
- <sup>ii</sup> <http://ocw.jhsph.edu/courses/PublicHealthBiology/index.cfm>
- <sup>iii</sup> [http://ocw.jhsph.edu/courses/PublicHealthBiology/lecture Notes.cfm](http://ocw.jhsph.edu/courses/PublicHealthBiology/lecture%20Notes.cfm)
- <sup>iv</sup> <http://www.learnodes.com/>
- <sup>v</sup> <http://biology.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.pbio.0050183&ct=1&SESSID=24b1e973282ed90b387211c3c43de82b>
- <sup>vi</sup> <http://www.virologyj.com/content/4/1/70>
- <sup>vii</sup> <http://vimeo.com/2018287?pg=embed&sec=2018287>
- <sup>viii</sup> *Washington Post*, November 16, 2008. <http://www.washingtonpost.com/wp-dyn/content/article/2008/11/15/AR2008111500190.html?hpid=topnews>
- <sup>ix</sup> Nicholas Carr, *The Big Switch*, W.W. Norton, 2008, p. 153.
- <sup>x</sup> Natali Gulbahce & Sune Lehmann. *BioEssays*, 30(10), 934–938 (2008). [www.barabasilab.com/pubs/CCNR-ALB\\_Publications/200809-17\\_BioEssays.../200809-7\\_BioEssays-CommunityDetection.pdf](http://www.barabasilab.com/pubs/CCNR-ALB_Publications/200809-17_BioEssays.../200809-7_BioEssays-CommunityDetection.pdf)
- <sup>xi</sup> <http://www.barabasilab.com/>