

Commentary on:

Resource Profiles

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In *Resource Profiles* in this special issue of JIME, Downes outlines a possible future of educational resource use from the perspective of the semantic web. The main contribution of Downes' article seems to be his constant rejection of the current way of thinking. He challenges us to reconceptualize learning objects, reconceptualize metadata, reconceptualize intelligent agents, and suspend our assumptions about other educational technology conceptions so that we can better imagine what the world of educational technology can become.

While Downes pries open our minds and promotes our taking a fresh perspective, some of the assumptions he rejects with the status quo are not only worth keeping, they're essential to the success of educational technology in facilitating learning. Downes himself reveals throughout the paper just how hard it is to let go of these valuable ideas.

In this response to Downes' very substantial article I can touch on only a few points. I have chosen to pass over the technical comments which might be made (e.g., concerns about reliability and availability with the proposed system of distributed resource descriptions, or praise for his honest criticism of the intelligent agent paradigm) and focus on pedagogical issues raised by his description of the possible future of educational technology. I will particularly focus on my own views of the role of humans in the automated, intelligent, semantic web future of educational technology.

Learning Objects and Resources

In the opening of his article on Resource Profiles Downes states:

a 'resource' may be anything that may be described in a 'resource profile'.... no prior assumption is made regarding what may, or may not be, a resource, and *no prior assumption is made regarding the structural, physical, or other characteristics of a resource*. What makes something a resource is nothing more than the fact that somebody, at some time, considers it to be a resource (emphasis added).

Apparently, nothing is ruled out *a priori* from qualifying as a resource. In defining resources so broadly, Downes appears to follow the IEEE/LTSC definition of learning object, “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning” (LTSC, 2004). I have frequently criticized the IEEE definition as essentially useless, since it fails to disqualify any person, place, thing, or idea in all of human or other history. It equates learning objects, or in this case resources, with nouns.

Statements made later in the paper reveal that Downes actually does make several assumptions about what is and is not a resource. For example, he explicitly excludes humans from being resources – “it does not even make sense to think of a learning resource as having a criminal record (only humans have criminal records).” More generally, he states that the purpose of a resource network is to enable people to “create, store, locate, and retrieve resources.” These qualities of being creatable, storable, locatable, and retrievable across the network seem to imply that only *digital* materials qualify as resources in Downes’ conception. This more narrow definition of resources as digital agrees with my own thinking on the nature of a learning objects – “any digital resource which can be reused to mediate learning” (Wiley and Edwards, 2002).

I very much agree with Downes’ subtext that the types of educational resources we should be discussing in the context of the semantic web (and in other important instructional technology conversations) are *digital* resources. I personally find digital resources superior to others in the context of my work on access to educational opportunity. Digital resources are (as the motion picture and recording industries have recently learned) nonrival in nature. In other words, digital resources differ from physical educational materials in that learners do not have to compete for their use. An online book may be accessed simultaneously by thousands of potential learners; a physical book may be in the possession of only one learner at a time. A digital frog dissection simulation may be perfectly reproduced and redistributed across the network thousands of times at practically no cost; a physical frog dissection kit costs money to assemble, package, warehouse, and ship, and each additional kit costs an additional amount to assemble, package, warehouse, and ship.

In recommending that we stop talking about learning objects, and instead speak only of “resources,” I believe Downes has done the field a favor. While “learning object” sounds like something specific, there has been little if any convergence toward a common meaning in the decade since the term’s introduction to the vernacular by Hodgins in 1994. “Resource” maintains the ambiguity inherent in the term “learning

object” without the pretensions of a specific definition. Perhaps the field should move on from “learning objects” to talking about resources as Downes suggests. I hope the conversation will be slightly more specific and focus on reusable digital resources.

Systems of Description

In explaining the need to describe resources, Downes states:

the system of description we adopt cannot presuppose any of three major sets of criteria: the vocabularies used to name either objects themselves or properties of objects; the set of logical relations between logics; and *the standard of 'rightness' of a description* (emphasis added).

However, in describing the problem of trust Downes goes on to explain:

A second major problem regarding the description of resources revolves around the assumption that the person or organization providing the description will be motivated to *provide an accurate description* (emphasis added).

Downes describes problems in the implementation of the <META> tag in HTML, including the falsification of information in resource metadata, and very appropriately refers to the phenomena as “information pollution” (e.g., stuffing “Elle Macpherson” values into the metadata for an online gardening store). The underlying assumption in the statement of the trust problem is that resource metadata should *accurately* describe resources, as opposed to the earlier claim that no standard of rightness be assumed *a priori* for a system of resource description.

Again, I agree completely with this assumption. While I understand that (especially for the subjective characteristics of a resource) no single True description of a resource may be possible, I also understand that multiple False descriptions are definitely possible. For example, a digital image of the Mona Lisa may mean many things to many people – it may be an example of fine art to one, an example of a beautiful woman to another, an example of certain painting techniques to a third, or something else to someone else. However, the digital image of the Mona Lisa is certainly *not* a large shrub growing behind my house in Logan, Utah. Such a description would be undeniably False, and an example of the “information pollution” Downes describes. If we cannot call accuracy a desired “standard of

rightness” of any system of description *a priori*, then I believe that the system would serve no purpose in facilitating the storage, location, and retrieval of resources.

The Intelligent Network

I found myself nodding in agreement with Downes’ doubt in the magical future of intelligent agents:

The use of intelligent agents, however, simply places on computer software the onus to perform tasks that humans have thus far not been able to do. There is no reason to suppose that agents will be more successful, because agents will face the same problems humans do.

He proposes the idea of a self-organizing network as a solution to this quandary. But I’m confused by his conception of self-organizing networks.

That is not to say that no human intervention is required: people will, of course, have to create resources, describe resources, and use resources. But it is to say that the impossible task of organizing, sorting, filtering and retrieving these resources will be *performed not by agents working on the network, but by the network itself* (emphasis added).

It is extremely interesting to me that in recommending self-organizing networks Downes assumes that human or even software agents are not involved, but that the network somehow organizes itself. Harkening back to his earlier comment about the trouble with intelligent agents, I am uncertain why we would expect the network to be able to locate and organize resources to support learning when neither agents nor humans are able to do so. It seems that the same criticism may be fairly leveled at the network-only approach if we do not first enable humans to locate and organize resources effectively. Automation generally requires explicit, algorithmic tasks which can be carried out by machine. If we knew what these tasks were we could enable the location and organization behavior in humans, and I believe this is the important next step.

Rather than the neural network view of self-organization, I believe that the social view of self-organization is a more useful frame of reference for what future educational technologies will enable in terms of resource location and organization. The self-organizing systems models we have utilized in our online learning research at Utah State University are social in nature and based completely on the interaction

of relatively simple, autonomous agents (people, insects, or software agents) following simple rules (Whitaker, 1995). Bee hives, ant colonies, market economies, and flocks of birds are illustrations. For example, 50 birds may take flight from a telephone wire. If each bird follows the rule “choose another bird at random, fly toward it, and try to fly within about three feet of it,” a flock will eventually emerge from the flight of the individual birds. No single bird is the leader. This complex flocking behavior emerges from completely autonomous agents following a simple rule, as can be easily seen and explored in StarLogo (<http://education.mit.edu/starlogo/>) or other simulation environments.

Wiley and Edwards (2002) described how massive social self-organization, already partially observable in large social forums like Slashdot, enables nontraditional ways of interacting with resources.

- **Indexing and Discovery:** Learning objects are not cataloged with metadata and submitted to a central curator repository. Community members know of existing resources and local resource collections. Individual resources are discovered through “community queries” in which community members respond with pointers to resources they know about personally. When a sufficient portion of the community responds in this manner, the learner locates satisficing resources.
- **Combination:** Learning objects are not automatically populated into one of many instructional templates. Without the direction of any single grand architect, peers contribute relevant resources and descriptions of how they might be employed within the context of the initiator’s problem. Much like a colony of ants, peers autonomously build on one another’s work and create a satisficing resource structure without centralized direction (Bonabeau, Dorigo, & Theraluaz, 1999).
- **Use:** Learners do not sit through a temporal sequencing of resources and assessments linked to decontextualized instructional objectives. They employ resources provided by peers as mediational means in the solution of a self selected problem or accomplishment of another self-selected goal (Wiley & Edwards, 2002).

Once humans’ location and organization of resources has been more fully enabled, we can study this phenomenon and work to successfully automate it. For example, word of mouth recommendations of restaurants, movies, and music have long been highly accurate in helping individuals locate new entertainment resources. As this technique has been understood, attempts have been made to automate social recommendations.

Recker, Walker, and Wiley (2002) proposed an Amazon.com-style recommender system that would observe which learning objects individuals used together, and then recommended resources to new users based on a “customers who bought these four books also bought these other two” model. In a dissertation study Walker (2002) developed and tested a recommender system which made automatic resource recommendations to learners in order to support their study. Recker and Walker (2003) also carried out a study in which a system recommended resources to teachers for classroom use. More interestingly, their system also recommended individuals to each other, supporting the emergence of ad hoc social networks of interest.

Conclusion

I greatly respect the perspectives that Stephen has put forth and the effort he has made to clearly explain his positions. We would all do well to periodically suspend our current beliefs (to the best of our ability) about what educational technology is and where our past is pointing us. While our history strongly suggests a forward path of incremental improvements, there are other paths we might take. The type of thinking Stephen encourages with his article is the type of thinking that moves fields ahead in catastrophic leaps. I sincerely hope that many people will read his article and take it seriously.

Like Stephen, I have long held that making educational offerings more scalable is highly desirable, especially in order to reach out to underserved populations. Automation has been the field’s favorite answer to the scalability question. (“How can we get more educational opportunities in front of more people? We don’t have enough teachers to serve them all!”) The answer has frequently been “build intelligent or automated systems to do whatever it was the teacher was doing.” Some proponents of the educational semantic web seem to be adopting this vision.

I understand that Downes’ paper deals exclusively with resources and their profiles, but I hope that educational technologists interested in the semantic web will not turn their research efforts into a more sophisticated attempt at ITS-style people-free education. Reacting to the field more generally and not Downes’ piece, I continue to wonder why some individuals feel the best use of the most powerful communications medium of all time is to obviate communication. I simply cannot imagine a world in which I interact mainly with pseudo-intelligent computer systems, to the near exclusion of human beings, being educationally effective, satisfying, or rewarding. We must fight to insure that humans have a place in the future of educational technology.

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