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Commentary on:

The Ecological Approach to the Design of E-Learning Environments

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Ecological web overview

Gord McCalla's paper describes the development of a user-centred system that links and accrues individual learners' profiles, usage and ratings data to learning objects. This allows algorithms to identify and recommend those learning objects that are best tailored to a learner's purpose and learning style. He uses the concept of the "ecological web" as a metaphor for the evolutionary journey (birth, growth and death) of online learning objects from the moment that they are added, through their useful life as a resource, to their deletion once obsolete.

Gord also uses the term the "pragmatic web", because his model is purpose driven. Instead of imposing an external ontology in the manner of the semantic web, descriptive data regarding an object's relevance and effectiveness for individual learners, is accumulated during use. This data includes the cognitive and learning style, goals/ purposes, as well as actual usage data (e.g. duration and patterns of use) of every learner who access the learning object(s) as well as data regarding the object's effectiveness for each learner. In effect, each learning object collects a comprehensive learner snapshot from every person who uses it. Various algorithms cluster and mine this user-centred data, and interact with the aggregated data of all the other learning objects in the repository to assess and then recommend which object or specific pathway is likely to be most useful for any particular learner. The wealth of grounded data generated in this manner allows patterns to emerge regarding learning object effectiveness as related to various learning/cognitive styles. This data can inform educational theory and practice, as well as generating robust learning ontologies.

To help visualise this, it may help to think of an Amazon-like collaborative literature review and recommendations tool that assists you to keep track of developments in your field. It updates you on the latest relevant publications and conversations (also learning objects), reporting their impact by the number of citations as well as the

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ratings and reports of impact by others. New developments in your field are presented in your personal learning and cognitive style as an individualised (curriculum) pathway through the domain. This builds and extends your understanding in the most natural and effective way for you. For example, if you prefer a global visual overview it might begin with a concept map, if you prefer a sequential approach it might start with a specific issue of interest. Furthermore, the system selects a cohort of people with complementary learning needs, experience and styles so that the dialogue has the best chance of being fruitful. The system also provides the ability to find answers to urgent questions through polling who is available with the relevant knowledge and learning style, so that they can assist you in real time.

So can the ecological web approach deliver something as powerful as this? Well, Gord suggests that this might be some time off yet.

Lessons from online learning communities

ULTRALAB shares Gord's vision of engaging [1] (and therefore delightful) learning using technology. Our message is that the best learning is active and collaborative and that the practitioner / student voice provides insight and dynamism, and deserves to inform and direct the discourse. Our projects [2] provide software tools that empower learners to direct and control their own learning in collaboration with others.

Our work in online learning communities and communities of practice has included a focus on;

- generating informality to provide the foundation for community, dialogue and deep learning,
- the appropriation of ICT tools by practitioners to assist them achieve their goals,
- normalising transparency and collaborative practice, and
- professional facilitation to ensure relevance and engagement.

So is there a symbiosis between the ecological approach and learning facilitation?

Our online facilitators are educational professionals. They know the territory, the agencies, key players, stakeholders, and are familiar with classroom practice and the current issues and problems facing schools. Facilitation provides "the human" face to

the online experience, and focuses on building relationships between members based on an understanding of their needs and assets. This is frequently a tacit, even intuitive process, scanning the member's list whilst using memory and imagination to see the possibilities. Equally, good learning facilitators know the right question to ask and can identify which part of the mental model is missing. There is no doubt however, that as conversations proliferate, and memberships grow, it is impossible to track all this data. So how this vital human element interacts with, benefits from, and informs an ecological model is worthy of exploration.

We argue that informal learning communities and communities of practice can challenge members to deepen their understanding [3], especially when genuine engagement leads to dialogue, with its potential for conceptual change. This is why the vision sketched above also includes the conversations as learning objects.

There is no doubt that communities of practice leave marks in the sand. Some of the Talking Heads [4] (an online community for all English head teachers) conversations have been very frank and/or specific to an audience or a moment in time. For example, when the government implemented policies to link teacher's performance to pay, numerous discussions amongst head teachers unpicked the implications for their unique as well as shared circumstances, and generalised the lessons across contexts. The policy makers were then given the opportunity to account for and clarify their policies via open forum "hotseats". Realising the power of these conversations has assisted the UK Department for Education and Skills (DfES) to begin to adopt an ethos of consultation, thereby appropriating learning communities to inform new policy initiatives. These "pathways" of conversations are vectors of direction and speed where the direction is depth and impact, and velocity is the time line. This is all part of the complex data set that is part of every conversation. These are revisited, extended and reviewed, and combine to capture a rich story of learning through the generative process of dialogue at a specific period in history. It has been our practice to summarise and/or archive these dialogues with sensitivity to their context and use. There is no doubt however, that information in archives is easily lost, retrieval of precisely the right learning at the right moment in time is still greatly simplified by a knowledgeable facilitator. Ecological algorithms could provide a great service by assisting community members to quickly find relevant conversations or "learning objects" from the vast archive or recommending specific members who have relevant experience. This could also free the facilitator to focus on mentoring and more tacit facilitation tasks.

How algorithms determine what is obsolete is difficult to imagine. For the learning facilitator this is often a difficult task. Conversational data might contribute to a future audit trail, even if it is "doh, that was a dead end!". Even the questions that are raised and never answered tell a story. For example, being too specific in a question can prevent the possibility of an answer being offered, and can also inadvertently provide evidence of those who are absent or silent eg "Are there any male nursery head teachers here?". It is difficult to imagine algorithms that can address this level of complexity. On the other hand, human facilitators might speed up the recognition and interpretation of patterns in the algorithmic data.

It would be interesting to know whether the ecological approach can determine the degree to which a sense of community and effective facilitation deepen learning, and whether this generalises to the majority.

The Web as tool for learning

Although Gord argues that voluntary data input by members is difficult to achieve on the open web, might this not change if the ownership lies at least in part with the learner?

It is clear that purpose driven websites like Amazon amass a lot of information via voluntary text entry and by usage, regarding both users and the "learning objects". Products are voluntarily reviewed and the review's usefulness rated by users. Effective reviewers are badged as "top 500 reviewer". Recommendations for popular items in the category of interest are hotlinked or take the form of "members who read x also read y". Cookies ensure that the site is personalised with recommendations across all media types when the member returns. Additional functionality is provided for those who are interested to; access their previous searches, generate "wish lists", and/or edit their personal page to reflect their specific interests.

The strength of this system is that it isn't doing it all "for" you but also has an element "of" you. Ownership is injected into it. So how might this be achieved with an ecological approach on the open web? Current web based learning systems allow learners to tailor their profile, edit their search history and purpose as their interests change, generate a learning portfolio and /or cv, and download a copy of their learning record to their hard drive. Can an ecological web approach build on this by providing updating and recommendations functionality via the open web? Perhaps the varied public annotation experiments [5] that have proliferated on the web in recent years have lacked an authentic purpose.

Participation might also be motivated if learners could directly benefit from the algorithmic analysis of the collective use of the ecological web. Perhaps this could inform strategies to stimulate meta-cognition and/or to scaffold learning and teaching, for example simply by highlighting examples of effective practice for specific learning styles. In our online communities we have found it useful to be explicit about what online learning looks like. Conversations deepen once members recognise reflection, critical questions, synthesis, new insights, assumptions and the importance of giving feedback on the impact of the conversation on their practice. This taxonomy data [6] might be attached to learning objects by facilitators, or by learners themselves. As participants in conversations, facilitators too could have profiles, and objects would accrue data about their interactions.

Learner object data might also be anonymised and aggregated on public servers to inform service provision and policy. There are of course significant implications for privacy and ownership of knowledge if this approach was adopted.

It appears that ecological approaches offer significant promise to the domain of online learning by assisting members to identify key information, conversations and people with relevant experience and information in a style that best suits them. At the same time, the importance of the social and affective domains to learning, as well as the key contribution that facilitators and educators can make must not be discounted. It is possible however, that the right combination of tools and learning facilitation can provide scaffolding to inspire confidence and skill for learners facing the demands of academia. It will be a greater accomplishment still if this research informs the development of tools for accessible, empowering, collaborative and engaging learning for the global lifelong learning community.

Notes

[1] Engagement is generated when challenges match and slightly exceed a learner's developing skills as described in Csikszentmihalyi, M. (1992). *Flow: The psychology of happiness*. London: Rider.

[2] ULTRALAB's current projects include:
The International certificate in Digital Creativity http://www.i-cert.net/
eViva http://rubble.ultralab.net/qca/
m-learning http://www.m-learning.org/
Summer school http://birdseye.ultralab.net/summerschool/

[3] Dialogue and community Chapman, C., Ramondt, L., Smiley, G. Strong Community, Deep Learning: Looking for the Link. (submitted to Seda for publication) , 2003

[4] For an overview and description of Talking Heads see http://intra.ultralab.net/~leonie/cothsreport02/index.html

[5] For a report on CritLink see http://www.foresight.org/WebEnhance/Progress9708.html Controversy was generated by web the use of third voice as reported at http://www.ocreport.com/features/thirdvoice

[6] For an example of such a taxonomy see 1.8 at http://rubble.ultralab.net/programmes/section1.html