Web 2.0 Semantic Systems: Collaborative Learning in Science

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Overview

BOT 2.0 is an NSF CCLI- funded project investigating approaches to recruitment, retention, and increased collaborative learning in science education

•BOT 2.0 combines an invitational hands-on weekend program called BotCamp with metadata approaches and Web 2.0 cloud memex technology. ·Our research involved student metadata literacy, tagging vs. structured metadata for plant identification, and metadata usage in the context of plant identification exercises.

BotCamp | Participants



BotCamp targeted undergraduate minorities and historically disadvantaged students from a range of institutions in the Piedmont region of North Carolina.



"Cloud Memex" Technology

Our conception of a memex is not a centralized black box but rather a flexible, distributed aggregation of the best services from the public Web 2.0 "cloud."



Plant Identification Experiment

The plant ID metadata experiment assessed students' understanding and use of structured metadata, taxonomies, and folksonomic approaches for learning about botanical science.

Students were split into two groups for a short plant-identification exercise. One group was given a short lesson on folksonomy and its uses in plant identification and learning a new domain; the other was instructed on taxonomy and its role in botany and plant identification.

In the course of the assessment, students were asked to describe the characters, character states and give as many names as they wished for four plant samples.

Folksonomy Condition	Taxonomy Condition
2.43 names or descriptors per plant	1.71 names or descriptors per plant
0 scientific names per plant	0.29 scientific names per plant
0.25 common names per plant	0.75 common names per plant

These differences were attributable to differing instructions for the same exercise, but also reflect the general difference of a more-exhaustive process of description-folksonomyversus a more-precise process of description. Most students did not offer confidence ratings for their identifications, but of those that did all who were very confident of their identifications were in the taxonomy condition, and all who assessed in the folksonomy condition were not confident of their identification.

All who responded to the question "I would like to find out more about botany in the future" (seven of the 14 across both conditions) said that they strongly agreed with the statement-a difficult exercise did not deter them. In direct feedback and later in focus groups, it became clear that one particular aspect of taxonomic identification (included on the test for both conditions) was very confusing, that of the difference between characters and character states and their respective definitions.



metadata before? If yes, someone else's (a person or please describe metadata." " words that describe data ' photographs on the web?" "data that helps search engines find what [vou are] looking for"

group's) digital

"Have you heard the

word Folksonomy before?"

Metadata Usage

Student auotes from focus group interviews

1."Being able to see what other people in my group were calling, I mean labeling, plants was really helpful in the learning process. It made the lesson feel more collaborative and we could figure out where we were in relation to others that were studying the same plants "

2. "I really hadn't used the tagging function in Flickr before, but doing tagging at BotCamp... I'm hooked. It makes the photos have more meaning."

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An example of tagging and other metadata creation by students in the Bot 2.0 project.

Future Research

Bot 2.0 ++

In 2009 we will conduct round two of BOT 2.0 to generate additional data. Building on the successes and lessons learned from the first iteration of BotCamp, we will fine-tune the curriculum, pedagogy and implementation of technologies in support of continued innovations.

Moving novices toward the expert's semantic space

Data suggest that folksonomies can function as a learning bridge, providing a cognitive sign-post which can then be re-directed towards more structured taxonomies at later stages and with the assistance of instruction and expert input. For instance, "rounded sections" is a reasonable enough description of many oak leaves-when informed that the feature can be thought of as two botanical character states, "lobed leaves" and "rounded tips," students can then more easily associate their initial, common-sense classification with a more botanically precise one.

Botany in particular is fertile ground for this approach, as field botanists commonly use an approach to identification of unknown species relying on the use of folksonomy-style categorizations. Further integrating these established uses and the other affordances of social technologies will allow for greater exploration of the unstructured-to-structured approach to new knowledge acquisition.

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