A PEDAGOGY FOR LEARNERS IN THE CO-CREATION OF KNOWLEDGE AND THE PROBLEMS THAT CONFRONT IT IN PRACTICE

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Abstract
Web 2.0 describes both a philosophy of user contribution and control and sharing with others as well as the software tools that facilitate the philosophy. While many are seeing the potential benefits for education the instructor may not be aware of practical ways to implement the philosophy within a higher education programme. This paper responds to this need by presenting a taxonomy of learning activities that involve learners in the co-creation of content for themselves and others. Examples from practice illustrate each node of the taxonomy. Regardless of the relationship of such contribution-oriented activities to Web 2.0, they can be seen as good pedagogy from both research and social perspectives. However, despite their motivation, there are many barriers that confront contribution-oriented learning activities from actually being carried out in mainstream practice in higher education. These barriers relate to quality assurance, from instructional and institutional perspectives. Can the potential for learners in the co-creation of knowledge overcome these barriers in practice?

Web 2.0 and its potential in higher education
What are Web 2.0 tools and services? The phrase Web 2.0 was first used in 2004 to refer to Web-based services emphasizing online collaboration and sharing. Howe (2006, p. 60) categorizes four general types of processes within Web 2.0 applications that reflect these ways of interacting:

- for sharing user-contributed content
- for evolving community-developed tagging and organizational schemes for sets of user-contributed content
- for developing content collections by the user community
- for finding not only objects but trends and overviews of contributions

User contribution possibilities are common throughout all of these Web 2.0 processes. The processes represent new ways of making, sharing and using digital documents. For higher education pedagogical approaches that involve students making contributions that are used for learning resources by others represent one way of applying Web 2.0 in practice. Such collaboration approaches are being called a key emerging technology for higher education (The New Media Consortium & the EDUCAUSE Learning Initiative, 2008).

A contribution-oriented approach can be motivated by educational and social principles rather than any specific reference to Web 2.0. From an educational perspective, the learning model reflects an extension of Sfard's two "metaphors for learning" (1998)--learning by acquisition and learning by participation--with the idea of participation by contributing to a shared knowledge base.

Contribution-oriented pedagogical principles are similar to Kearsley and Shneiderman's (1998) *Engagement Theory*, and to *Action Learning* (Simons, 1999).

A contribution-oriented approach to learning activities also has a strategic motivation. The need for participation and contribution reflects current developments in society. Internationalisation, the world becoming a global community, the fact that individuals can expect to work in different settings and as members of multifaceted teams, and the need for social skills and communication skills: all are commonly described as characteristics of living and working in a Knowledge Economy that are rapidly gaining in importance (The World Bank Group, 2003). In corporate settings, global networks and other forms of knowledge-sharing communities are key tools in learning from the tacit knowledge of others in the corporation. This learning comes from finding relevant examples and resources contributed by others in the company, asking others in the community for help or clarification, or by joining in debates and discussions on how to generate solutions for workers' real problems. In professional contexts, for learning communities or communities of practice, digital workbenches increasingly serve major roles in the ways in which people in a common company or professional group interact and learn from each other (Wenger, 2005). Thus a contribution-oriented approach making use of Web 2.0 tools and reflecting Web 2.0 principles is also preparation for the professional workforce.

A taxonomy of learning activities reflecting Web 2.0 contribution principles

Discussions of the applications of Web 2.0 principles to education are frequently organised around types of Web 2.0 tools and environments (i.e., blogs, Wikis, podcasting, and other forms of social software, see for example, Alexander, 2006). For the instructor this may not be a helpful approach. Even a phrase such as contribution-oriented pedagogy may be hard to translate into practical examples for one's own teaching situation. The taxonomy of learning activities shown in Figure 1 has been developed to help instructors to identify concrete learning activities that could be usable in their teaching without expliciting discussing either technology or an educational philosophy. We have developed the taxonomy out of our own experiences as instructors and have validated it with different groups of instructors in both higher education and corporate learning (Collis & Moonen, 2001; B. Collis, 2006).

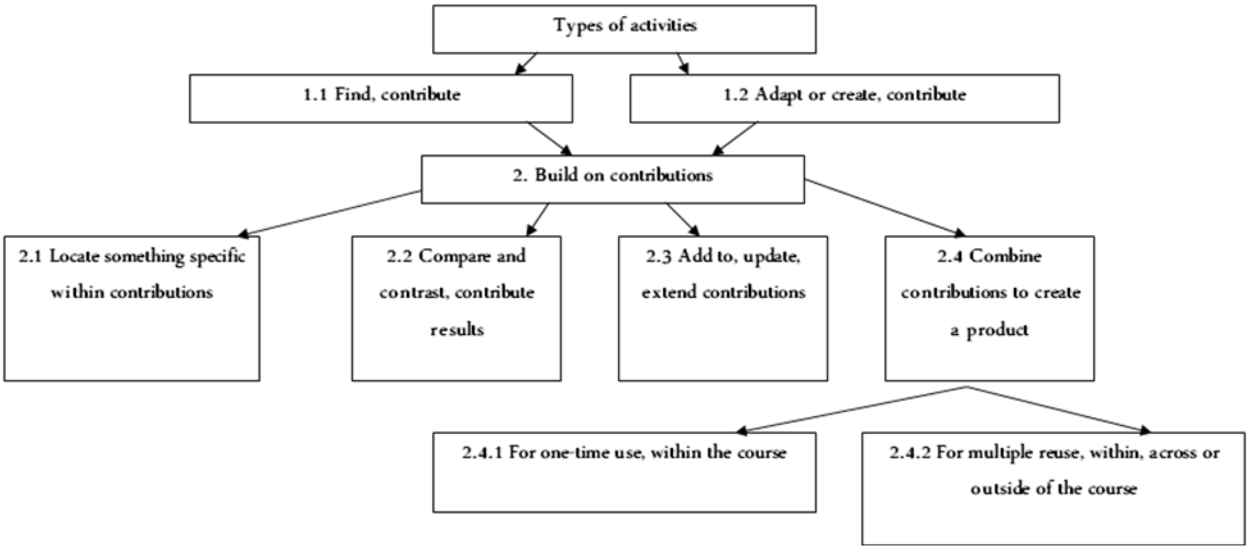

Figure 1. Taxonomy of contribution-oriented learning activities

The Level 1 activities are the simplest to visualize and implement. Here the students only need a platform that they can all contribute to in order to build a set of artefacts that can be used for learning. Some examples are:

Level 1.1 Find and contribute:

- Appropriate Web links or references to extend the study material
- Examples of concepts or issues

Level 1.2 Create/Capture and contribute:

- Interview results
- Summaries of readings
- Questions that arise during project work and discussions
- One's own reflections, concerns, ideas
- Video/audio clips

Level 2 activities go a step further. After the collection of contributions has been gathered, subsequent learning activities involve using the collection.

Levels 2.1 & 2.2 Locate/Compare & contrast among the contributed resources

- Find groupings and trends; visualize them in a concept map or other sorting scheme
- Identify particular contributions that best illustrate or extend the study materials
- Compare and contrast your own entry with those of others; identify similarities and differences
- Select key themes that emerge from the personal reflections or interviews and discuss

Level 2.3 Add to, extend the collection with

- Frequently asked questions (with answers)
- Practice exam questions (with explanations)
- Index terms, glossary entries
- Web links (adding something that can update or replace a previous entry)
- Add comments or extensions to previously submitted items (such as to Wiki entries)

Level 2.4.1 Collaboratively create a new product for one's own classmates or those in later generations of the same course

- Hints and tips for others studying the same materials
- Resources for peer coaching during the course
- Case studies from participants' own work and experience to be studied by others during the course
- Video/audio clips of interviews or examples to illustrate and extend the study materials

Level 2.4.2 Collaboratively create a product for others outside of the course or module

- A resource collection for practitioners, available via the Web
- A collection of information for a community or for local industry
- Materials for students in local schools to interest them in an area of study

The Level 2.4 contributions are the most interesting educationally and socially as they involve contributing to the learning of others beyond the boundaries of a specific course or module (reflecting what Kearsley and Shneiderman, 1998, call Engagement Theory). As an example, C. Collis describes how such an approach can be a valuable tool for building partnerships between a university faculty and local businesses (C. Collis, 2006)

Barriers for practice

Thus, we have a rationale and we have specific examples of how to implement the rationale in practice. But can we expect widespread change in educational practice? In our experience, the answer is no. We have discussed this in terms of collisions between such an approach and student and organisation expectations of learning (Collis & Moonen, 2008). A major problem is the mismatch in terms of what students (and institutions) expect from a course or module. Zurita (2006) has noted that such changes in pedagogy may not fit the expectations of the students, and thus may not be positively valued by them. Zurita found that students are "more prepared to have a teacher-centred course than a learner-centred course….and felt uncomfortable" when expected to design learning materials for themselves and their peers" (p. 6). This is reflected in a recent survey of Finnish university students who saw themselves as only passive users of Web 2.0 applications (i.e., non contributors) in learning contexts (Kynäslahti, Verterinen, Lipponen, Vahitivuouri-Hänninen, & Tella, 2008). We call these Mindset barriers:

> *Mindset-change conflicts*
> Students have said to us "Why don't you just give us what we are supposed to learn? That would be much more efficient" and even more sharply, "It's your job to teach us". These sorts of comments reflect a mindset about the role of the teacher as the one responsible for the flow of quality-assured study materials, and the role of the students as the ones responsible to know what is in those study materials in order to pass a test or do an exercise.

Other barriers to implementation from the instructor's perspective include:

Management burdens
A key characteristic of contribution-type activities is that the instructor does not know in advance what the students will contribute and thus has to study carefully what is contributed. Thus, if instructions are not clear and explicit about what is expected, in terms of scope, origin, criteria, length, and presentation, the management burden can become enormous.

Assessment-related issues
Assessment is the major challenge for the instructor in a contribution-oriented pedagogical approach. By definition, there are no pre-determined "right" answers, but instead will be different degrees of appropriateness on different dimensions. Students are, understandably, highly sensitive to potential ambiguities in grading and marking.

Intellectual-property considerations
In the university setting, issues of intellectual property make the processes relating to building on other's contributions complicated. Students need guidance and coaching on how to properly use and cite the work of others, a particular problem when the cutting and pasting of work in digital form is technically so simple.

Time burdens
A contribution-oriented approach takes more time for the instructor than a traditional course, not necessarily more time before the course, but certainly more time during the course. It takes more time to manage and assess contributions that bring in new ideas and experiences than it does to manage and assess assignments where everyone does the same exercises and should come to the same result.

To these instructor-specific barriers can be added those coming from the institution. There are at least four, potentially conflicting, perspectives on quality from the institutional perspective that can influence the uptake of Web 2.0 tools and processes in higher education practice. These perspectives relate to accreditation frameworks, expectations from external stakeholders, quality concerns relating to learning resources and experiences endorsed by the institution, and issues relating to IT policy.

Universities are under increased pressure to demonstrate quality around common standards (European Association for Quality Assurance in Higher Education, 2005). Thus any move towards a co-contributor pedagogy supported by Web 2.0 technology must also be monitored within the quality assurance perspectives important to the institution as an accredited degree-granting organization. Quality assurance processes give particular attention to the institution's procedures for student assessment. The European Association for Quality Assurance in Higher Education (2005) notes that each institution must have student assessment procedures that have "clear and published criteria for marking" and "are subject to administrative verification checks to ensure the accuracy of the marking procedures" (p. 17). The same concerns that face instructors and learners relating to appropriate assessment of contribution-oriented pedagogies will also be felt by the institution when it has to defend the validity and reliability of assessment practices for such activities. Student criticisms of assessment practices are taken seriously in quality assurance reviews. If students feel negative about the quality of learning activities and the way their performance is assessed, this will negatively reflect on the institution. In addition, from an institutional perspective, there are other stakeholder perspectives that challenge the value of student-created or contributed resources. Those who supply universities with scientific content (library services, textbook and academic journals publishers, academic bodies, and researchers themselves) take great care with the accuracy and quality of the resources they produce. The risk that students will find and produce material that is inferior and disseminate this as evidence of the scholarly level of discourse at the university is a major negative factor confronting the uptake of Web 2.0 processes and underlying ways of working in higher education. Conole, de Laat, Dillon, and Darby (2006) note that "the increasing use of user-generated content in the form of sites such as Wikipedia is challenging the traditional norms of the academic institutions as the key knowledge expert and providers" (p. 102). Institutions will be predictably concerned about public scrutiny of student contributions as well as issues relating to intellectual property.

The institution's IT policy can also be a barrier, especially when a commitment has been made to a Virtual Learning Environment system (VLE) and the VLE has only limited facilities for supporting a contribution-oriented approach. . C. Collis (2006) notes how complicated the support of her contribution-oriented activity became for the instructor:

> "Students need a well organized resource environment, in which the expectations of the course and appropriate support materials are available. They also need groupware tools, such as shared workspaces; tools for document version control and distributed annotation, feedback, and editing; tools that allow them to manage their own work-in-progress and at the same time make work ready for assessment accessible to peer reviewers and faculty before going public. They need tools to manage their shared agendas and for different forms of communication. They also need skills in communication via a web environment in terms of presentation design and user-interface considerations. In addition, students must be allowed admin or at least instructor-level access to certain areas of the institutional course-management system so that it is used more as a groupware environment than a course-presentation environment" (p. 6).

Considerable liaison between the instructor and the IT support services of the institution will become necessary as long as standard tools such as the campus VLE do not support students seeing each others' contributions or subsequently building upon them.

Is there a way forward?

Given these many barriers, the likelihood of uptake of a contribution-oriented pedagogy is low. However, for the motivated instructor we have compiled a list of recommendations for managing contribution-oriented learning activities to reduce the management load (Collis & Moonen, 2008). Some of these recommendations are:

- Be clear in the written instructions on the Web site for any contribution-type activity. Indicate clearly how much, in what form, the contribution should be and where in the Web environment it should be submitted. If it is a group submission, make it clear who should submit on behalf of the group. Provide a model or example. If possible, include a template to download, fill in, and upload with the contribution.

- For complex contribution activities, split the activity up into stages and give marks for each stage, thus three submissions of 5 points, 10 points, and 20 points instead of one final score of 35 points. In this way, students will better understand what you are looking for and can incorporate your feedback into the next stage of the work. This is particularly important for group projects.
- If an assignment involves adding to another student's previously submitted work, find a way to differentiate the work of the different students and maintain both students' names on the resulting product.
- Ensure that the students see you as a fellow learner. Pick up on ideas in their contributions and build on them in your reflections in the course Web site. Show that you are excited by what they find, for example new Web links, and what they produce as new resources for others.
- Block time each week for communication, feedback and management relating to the contribution-oriented activities.

With these sorts of management strategies the motivated instructor can probably implement at least a simple form of contribution-oriented learning activity (Level 1 in Figure 1) within his or her own course, assuming there are not insurmountable technical barriers in terms of institutional IT policy. However, dealing with institutional scepticism or disapproval of student contributions as learning resources will remain difficult for the instructor. Mindset change will be hardest of all.

The good news is that the tools for contributing and sharing are now easily available at least outside of the official IT suite of the higher-education institution. Using Web 2.0 technology to create and share one's thoughts and productions is a common-place activity for an increasing number of students and also instructors. At the moment this activity generally takes place outside the scope of formal education. The affordances of Web 2.0 tools and applications make sharing via Web environments an attractive pastime; hopefully a tool such as the taxonomy of learning activities presented in this paper can help match this potential to learning-related goals. Technology should not drive pedagogy, but a contribution-oriented pedagogy can become much more feasible and scaleable in practice using Web 2.0 tools.

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