# FROM COURSE MANAGEMENT TO CURRICULAR CAPABILITIES:

## A CAPABILITIES APPROACH FOR THE NEXT-GENERATION COURSE MANAGEMENT SYSTEM

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The contemporary course management system (CMS) is both a blessing and curse for our evolving understanding of the value of e-learning technologies within the context of higher education.

The upside of the CMS is that popular e-learning platforms like WebCT™ and Blackboard™ have provided faculty with an array of user-friendly tools for the rapid publication of course content and management. This has increased our collective knowledge base about successful online practices and the readiness, or lack thereof, of specific student populations for this mode of educational delivery. However, the downside of the CMS is that it canalizes our collective creativity by forcing e-learning technologies into the familiar classroom categories of lectures, discussions, and exams (with an occasional opportunity to chat with the professor or other students "after class"). The overall effect of these developments is that many educators and administrators are locked into a "classroom on steroids" model of e-learning that is more preoccupied with the categories of accessibility and convenience than pedagogical effectiveness and skill development.

The genetic weakness of the contemporary CMS stems from its uncritical acceptance of the traditional features of the classroom model. This, of course, is understandable, in light of the market-based desire for rapid adoption among faculty and the early association between the CMS and distance learning. The idea that e-learning was going to replace the traditional classroom with a virtual one necessitated a hierarchical, centralized architecture that placed the teacher firmly in control of core classroom interactions and content creation and management. The "classroom-plus" model of e-learning is well exemplified within the "no significant difference" literature, which used the traditional classroom as a baseline for evaluating the effectiveness of e-learning technologies. It was telling that advocates of Internet-based distance learning viewed the general conclusions of this literature as being favorable (i.e., there is no significant difference in educational outcomes between traditional classroom and online delivery systems); perhaps this view is reflective of low expectations associated with e-learning technologies or indicative of the perceived tradeoff between educational quality and the convenience factor that favored these new technologies.

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## Toward a Capabilities Approach

One suspects that the piecemeal criticisms that have been directed at the contemporary CMS point to more foundational questions about the nature of learning and respective roles of teachers and students in this process. Toward this end, a capabilities approach to learning could provide us with a forceful and intuitive means for envisioning what the next-generation CMS might look like. In this regard, the work of the Indian economist Amartya Sen, the 1998 recipient of the Nobel Prize in Economics, is instructive.

In his path-breaking book, *Development as Freedom* (2000), Sen outlines an approach to development economics and human rights that he calls "the capabilities approach." This development framework, in Sen's thought, becomes an organizing principle for unifying the traditional aims of human rights (related primarily to the exercise of freedom) with the goals of economic development. One of the signal strengths of the capabilities approach is that poverty is understood as a capability deficit—not simply restricted to the familiar domains of need deprivation or low household income. Sen's capabilities approach not only ties together disparate strands within development studies and human rights theory, but also provides us with an understanding of poverty that is equally relevant to both the more developed and less developed regions of the world.

What would a capabilities approach for e-learning or the next-generation CMS look like? I would like to set forth a heuristic model of such a capabilities approach by presenting four learner-focused capabilities and four capabilities that could be incorporated into new and improved versions of the CMS. The learner-centered capabilities are (1) a critical thinking capability, (2) a self-confidence capability, (3) a peer-learning capability, and (4) a knowledge management capability. The CMS curricular capabilities are (1) a discovery-based learning capability, (2) a 360 degree out-of-the-course capability, (3) a knowledge asset capability, and (4) a teach-to-learn capability.

## Learner Capabilities

### *A Critical Thinking Capability*

If education is about anything, it is about cultivating the skill of critical thinking. This appropriately occupies first place in the hierarchy of desired educational outcomes. It also lies at the foundation of metacognitive capabilities—the learner's ability to understand and manage his or her own learning processes. In this respect, critical thinking undergirds our ability to map unfamiliar knowledge domains and to discern plausible connections with more familiar domains. It is not insignificant that multidisciplinary curricula often provide a powerful matrix for the development of critical thinking skills.

One central attribute of critical thinking is the ability to compare one's own approach to the analysis of a problem or navigating an unfamiliar knowledge domain with the way that others explore and examine a similar problem or unfamiliar knowledge domain. This comparison of cognitive performances is made possible by first grappling with a problem or stumbling around within an unfamiliar knowledge domain—either by oneself or with others—and then reflecting on how those experiences compare with the performances of others (whether these are peers with a similar level of expertise or more experienced practitioners of the knowledge domain in question). In this regard, the theory of cognitive apprenticeship, with its methodological bias in favor of the modeling and coaching roles of both professors and students, provides a rich pedagogical framework for developing critical thinking skills (Brown, Collins, & Duguid, 1989; Collins, 1991; Collins, Brown, & Newman, 1989; Jonassen, 1996; Teles, 1993). One way to achieve this development is to provide students with meaningful opportunities for collaborative research with faculty, as is advocated by the National Research Council's report, *Bio 2010: Transforming Undergraduate Education for Future Biologists* (2003). We also have a long-standing and robust tradition from the U.S. Army that tries to achieve a similar critical perspective, called the "after action review," which requires participants to "pin their stripes on the door" in assessing what went right and what went wrong in a particular military action. This tradition has been respected even in the midst of heated battle (Collison & Parcell, 2001, pp. 75–86; Dixon, 2000, pp. 37–46).

**Our current exam-centric definitions of success and failure allow for little in the way of a learning payoff associated with the experience of failure.**

One of the great failures of contemporary higher education is the paucity of opportunities—particularly among undergraduates—for problem-based learning and the exploration of new knowledge domains. The surface-learning approach that characterizes much of undergraduate education places more emphasis on information acquisition and retrieval than developing the skills associated with the art of thinking. Moreover, there is a developing body of literature within the neurosciences that suggests that learning takes place by reflectively acting upon the material and thereby making it one's own (Bransford, Brown, & Cock-ing, 1999; Zull, 2002). It is not clear that there is any real long-term value associated with stuffing facts and figures into one's head and demonstrating one's short-term competency on an exam, except perhaps related to developing the skill of test taking or gaining a cursory (and usually short-term) understanding of a discipline's vocabulary, history, and methodologies.

### *A Self-Confidence Capability*

Self-confidence, next to critical thinking, is likely one of the most valuable outcomes of education—not only as a predictor for success in terms of one's career and professional development, but also in terms of one's overall readiness to take on new learning experiences. Self-confidence is nourished by the experience of challenge (whether this is physical, intellectual, or social), and, most importantly, by the ability to process failure constructively. It is not insignificant that one of the great stories of leadership in the 20th century, which has received considerable public attention within the past few years, has been a story of failure: the Antarctic expedition of Sir Ernest Shackleton (Morrell & Capparell, 2001).

Perhaps the most striking deficit of both the contemporary, face-to-face classroom and online learning is the absence of meaningful challenge. It has sometimes been said that curriculum developers would be out of work in a week if they applied their trade to the video game business. What is the challenge of a video game if you can reach level ten in the first couple of tries—or if there are no levels of difficulty to begin with? The experience of failure, even if it is safe and simulated, is an integral facet of the learning process (Shank, 2002, pp. 61–71). The proverbial $64,000 question, though, is how do you provide a meaningful and reflective environment for failure that also does not discourage learners? There are no easy answers here, but one thing is for certain: our current exam-centric definitions of success and failure allow for little in the way of a learning payoff associated with the experience of failure. Similarly, within the context of online learning, failure has been treated more as a navigational aid for directing the student to additional tutorials than as a meaningful object of learning.

One promising approach in the development of self-confidence skills is to encourage students to grapple with complex and ill-defined problems in the context of collaborative "think tank" groups. The attitude that should imbue these groups is not that of a traditional division of labor, but rather a perspective that views the group as an essential resource for analyzing problems and presenting solutions. Such a framework might also involve building in a scaffolding provision for outside consultants or experts (e.g., teaching assistants, industry professionals, more experienced student colleagues) as a resource for the group. In addition, one could require such think tank groups to develop a "failure narrative" of sorts, which details all of the unproductive approaches and dead ends that the group encountered along the way.

*A Peer-Learning Capability*

Among the more significant insights that have emerged from historical and ethnographic research on the traditional apprenticeship model (Lave & Wenger, 1993; Rogoff, 1990; Wenger, 1998) has been an appreciation of the neglected yet important role of apprentice-to-apprentice learning in contrast to the more prominent master-to-apprentice interactions. This insight on the apprenticeship model, underscoring the importance of peer learning, has received powerful and eloquent expression in the more recent "communities of practice" literature within the corporate realm (Wenger, McDermott, & Snyder, 2002; Wenger & Snyder, 2000).

There is, of course, some peer-learning component built into traditional curricula in higher education, largely taking the form of discussion or study groups in undergraduate contexts. Yet, the focus of these discussion or study groups is usually centered on digesting the material conveyed in a lecture or achieving a division of labor in preparing for an exam. The notion that the student sitting next to you might be a relevant and important source of knowledge—based upon his or her experience, aptitudes, and interests—is largely unexplored in most educational curricula (outside of the rarified environment of PhD programs). Given the importance of peer learning for a student's eventual success in the workplace, which often depends on strong networking skills and the ability to mine tacit knowledge stores, one would think that developing a peer-learning capability should be a chief goal of any 21st-century curriculum.

The evidence from workplace-related experience in peer learning, such as British Petroleum's "peer assist" initiative, suggests that a critical prerequisite for peer learning is encouraging people to drop their inhibitions in asking for help and to raise their overall awareness of the value of tacit information resources (through skill inventories and the formation of virtual communities). Two mechanisms that BP has used in reinforcing the value of peer learning include the use of "after action" reviews (both during the execution of a project and at its conclusion) and involving employees in the development of knowledge assets that have clearly defined "customers" and are adopted and updated by a relevant community of practice (Collison & Parcell, 2001). One prime area of application for the BP model in higher educational curricula would be the use of longitudinal, multigenerational research projects (involving the participation of successive "generations" of students) or one-time interdisciplinary research projects that have a clearly identified client (e.g., a community group, nonprofit organization, corporation, governmental agency).

*A Knowledge Management Capability*

The skills required by knowledge-based economies are not absorption and recall, but discovery and discernment. If higher education is about preparing students to assume positions of leadership and responsibility in the workplace, it must also be about helping students explore new frontiers of knowing and critically discerning the significance of "new" knowledge to "old" knowledge, mapping connections between more familiar knowledge domains to those that are less familiar. In sum, a 21st-century education should prepare students to be knowledge creators—not simply receptacles of existing knowledge.

There is a common misconception that knowledge changes so rapidly in the Information Age that it quickly becomes obsolete. This attitude reflects a fundamental confusion between knowledge and data or information (Stewart, 1997). Data or information change rapidly and have a very brief half-life; knowledge is a much more durable entity because it is rooted in both associational and critical judgment. Knowledge is more like a skill that is sharpened over time—not a textbook to be digested or something archived in a database.

Knowledge management (KM) theorists frequently draw distinctions among the terms *data*, *information*, *knowledge*, and *wisdom*. Data are simply raw, undigested facts. They often have an exceedingly small window of relevance.

Information is data placed within a meaningful context. Because information is data-centric by nature, it also has a brief half-life. Knowledge differs from data or information in that it requires skills of interpretation and judgment. Facts (i.e., data) and facts in context (i.e., information) become useful to us when they are interpreted and placed under the lens of human knowing; wisdom, which is rooted in knowledge, is the most durable of all.

While one can make a compelling case that all varieties of data and information must be interpreted in order to be sensible, this is particularly true with knowledge. Knowledge requires some exercise of judgment—either of an associational or critical nature. Associational judgments are based upon perceiving patterns, correspondences, commonalties, and dissimilarities that enable information mapping and support inferential reasoning. Critical judgments evaluate information from the standpoint of higher-order perspectives or templates, such as the principles of logic or aesthetic and moral values. Both associational and critical judgments are shaped by new information—sometimes requiring radical realignments in human judgment. However, knowledge is typically built upon a durable platform of associational and critical skills that are relatively stable in relation to wholesale changes in information landscapes.

Tacit knowledge is mined through conversation, not computers; it is inherently "messy," requiring dialogue, observation, or storytelling to be shared with others.

Wisdom might be described as the most durable variety of human knowledge, having qualities that appear almost timeless in character. Aristotle, in his *Nicomachean Ethics* (Book 6, Chapter 7), called wisdom "the most precise and perfect form of knowledge." Wisdom is more easily apprehended than defined; those who encounter it understand its value and immediately accord it with respect. One might also say that knowledge tells us "how," but wisdom tells us "why" (Pelikan, 1992, p. 35). The capability that enables people to "deliberate well"—what Aristotle called "practical wisdom"—is strongly tied to the attribute of discernment. The ability to filter the important from the insignificant, to perceive worth among the ordinary, and to hear a voice of authenticity above the din of background noise—these are qualities that exemplify discernment. The same holds true for wisdom.

If higher education is about anything, it must be about the furtherance of knowledge and wisdom, and this requires going beyond the limitations of what Michael Polyani (1966) calls "explicit knowledge"—knowledge that can be readily codified and shared with others—and venturing into the realm of "tacit knowledge," or knowledge that is inherently bound to the experiences, skills, and judgment of a person. Explicit knowledge can be organized in a database or set forth in a document; tacit knowledge must be teased out in the exercise of skills, problem solving, or judgments of an associational or critical nature. Tacit knowledge is mined through conversation, not computers; it is inherently "messy," requiring dialogue, observation, or storytelling to be shared with others (Davenport & Prusak, 1998, pp. 81ff.). It is not insignificant that when the World Bank undertook a major KM initiative, it began by setting up help desks and discussion groups that focused on sharing best practices, instead of attempting to catalog them in a large database (O'Dell & Grayson, 1998). Moreover, tacit knowledge, because it integrates experience with judgment, has the capability to generate new knowledge.

## CMS Capabilities

What sort of CMS could facilitate the development of student capabilities in critical thinking, self-confidence, peer learning, and knowledge management? While no CMS—this generation or the next—can assure the successful development of these student capabilities, given the importance of sound curricular design and faculty engagement for learning, one could point to four attributes of a next-generation CMS that would facilitate this student development: (1) a discovery-based learning capability, (2) a 360 degree out-of-the-course capability, (3) a knowledge asset capability, and (4) a teach-to-learn capability.

### *A Discovery-Based Learning Capability*

One of the great weaknesses of the contemporary CMS is its facile acceptance of behaviorist approaches to learning, which emphasize parceling up knowledge or skills into bite-sized chunks that can be easily digested (Fosnot, 1996; Walker & Lambert, 1995). Assessment mechanisms, like quizzes and exams, are designed to determine whether the student has mastered (at least in the short term) these discrete bits of knowledge before moving on to the next topic; it is up to the student, at some undefined point in the future, to put the pieces together. Learning, from this perspective, becomes analogous to moving along a well-trod and clearly marked road; and the main challenge, from a pedagogical standpoint, is to keep students moving down the road on schedule.

Unfortunately, educational technologies have largely served to reinforce the behaviorist bias in higher education. The ubiquitous PowerPoint presentation reduces knowledge to bullet-sized information parcels and adds legitimacy to the misplaced professorial concern with "covering the material" (instead of ensuring that students have some in-depth exposure to disciplinary content and methodologies). Similarly, many of the helpful aspects of computer-based instruction, such as the use of self-administered quizzes as a navigational aid in guiding students to supplemental tutorials, have an underlying bias in favor of behaviorist pedagogical approaches.

There are certainly contexts in which a behaviorist approach may make considerable sense—particularly in the arena of corporate training or introductory survey courses within lower-division undergraduate curricula. However, the weaknesses of the behavioral approach become painfully apparent when it comes to developing higher-order skills in critical thinking that require grappling with ill-defined problems (Huba & Freed, 2000) and exploring unfamiliar knowledge domains. This requires a discovery-based approach to learning that will be more at home within a constructivist orientation to learning.

Discovery, in the sense that I am using it here, could include coming upon a new disciplinary insight, mapping an unfamiliar knowledge landscape, playfully making connections between different knowledge domains, or "inventing" new conceptual or methodological frameworks. Even if this process of discovery brings forth nothing that is truly novel (which will generally be the case), the payoff is that students have firsthand exposure to the adventure of learning. And this exposure cannot help but strengthen skill sets related to critical thinking, self-confidence, peer-learning, and knowledge management.

From the standpoint of the next-generation CMS, a capability in discovery-based learning could manifest itself in three respects. First, the CMS should present a rich feature set for student-to-student collaboration that facilitates the creation of "storyboards" or "solution narratives" that document the group's approach to problem solving. Second, the CMS should provide a built-in learning log component that aids students in evaluating their own performances as learners (thereby strengthening their metacognitive capabilities). Third, the CMS should be flexible enough to in-corporate interdisciplinary and intercultural "border experiences" in learning that invite fresh perspectives on how knowledge in one domain relates to other domains or on the larger social-cultural implications of disciplinary knowledge.

*A 360° Out-of-the-Course Capability*

A second, next-generation CMS capability might be termed a 360 degree out-of-the-course capability. One of the key insights that has emerged from research on learning is the importance of "conditionalized knowledge" (or knowledge that specifies the contexts in which it is useful) as a core competence (Bransford, Brown & Cocking, 1999, p. 31). Knowledge that is not conditionalized—even though it may be present and highly relevant—remains "inert" (Whitehead, 1929). Both problem-based learning and interdisciplinary studies are key educational strategies that facilitate the development of conditionalized knowledge.

One of the significant liabilities of several popular CMS packages is their constitutional preoccupation with the "course" as a standard unit of measure. Everything is processed through the pre-established boundaries of the course, and this leads to the further segmentation of knowledge. There is no technical reason why this course-centric bias must hold sway. For example, one could envision CMS packages that are constructed with both course-centered and interdisciplinary (or multicourse) modules. The multicourse modules would be appropriately evaluated as works in progress until they are completed in some capstone-like, integrative course. A simpler way of expressing the same thought would be to build to a portfolio capability within the CMS.

A 360 degree CMS could also offer some exciting possibilities in terms of the incorporation of community educators (e.g., business professionals, nonprofit leaders, accomplished alumni) whose experience and perspectives can provide breadth and depth to the undergraduate learning experience. The educational services provided by such community educators could range from serving as a respondent for an online seminar or as an evaluator for a portfolio project to more substantial, team-teaching responsibilities as co-faculty members.

Given the increasing numbers of retired professionals in the United States, such an avenue for continuing service is a particularly important faculty resource for colleges and universities.

Another positive feature of a 360 degree CMS is that it could facilitate the development of team-teaching cultures without significant downsides of traditional team teaching. By any measure, team-teaching, if done correctly, is a time-intensive enterprise. Unless instructors develop a close working relationship, the benefits associated with a division of labor in teaching and grading are outweighed by the logistics of planning the course and coordinating teaching roles. By incorporating interdisciplinary or multicourse modules within the CMS, some of the educational benefits of team-teaching can be captured within a traditional teaching environment.

*A Knowledge Asset Capability*

The ability to create, modify and maintain knowledge assets is a core function of any community of practice. Perhaps one of the most dramatic examples of this is Wikipedia,[1] an online encyclopedia that allows Web visitors to modify or add content—the resulting modifiable page is called a "wiki." Other examples include the Best Practice Replication program at the Ford Motor Company (Dixon, 2000), in which "focal points" (i.e., production engineers) evaluate and adapt best practices from other Ford plants, and some fascinating recent experiments in developing internal markets that trade in information and ideas (Malone, 2004).

Providing students with the experience of creating knowledge assets that others will find useful not only provides a powerful impetus for study and research, but also encourages the development of important workplace skills (e.g., working collaboratively in virtual teams, providing critical yet tactful feedback, discerning the relevance of information) that will become increasingly important in knowledge-based economies. Ideally, these knowledge assets could be built within an "intergenerational" framework (i.e., the work of one class could become the starting point of another). In addition, if there was a specific customer in mind for the knowledge asset (e.g., a nonprofit organization or corporation), this would appropriately raise expectations concerning the overall quality and relevance of the knowledge asset.

One avenue for incorporating a creation capability for knowledge assets in the next-generation CMS would be to construct a wiki facility within the CMS package. Another possibility would be to extend the notion of student home pages into more robust Web sites. For example, one of the more promising applications of the knowledge room concept that I developed for *Deep Learning for a Digital Age* (Weigel, 2002) is the portfolio gallery, which gives students the opportunity to develop a peer-reviewed Web site on a topic of their choice.[2] This particular knowledge-room model makes it relatively easy to convert a standard research paper assignment into a Web-based presentation that can be reviewed by other students through e-mailing evaluations directly into the site.

*A Teach-to-Learn Capability*

A final, next-generation CMS capability might be termed a teach-to-learn capability. This approach emphasizes the importance of empowering students as educators and uses the lecture as a tool for individual learning and critical dialogue, in contrast to its traditional use as a professor-to-student medium for conveying information.

As James Zull argues in *The Art of Changing the Brain* (2002), authentic learning requires a profound interaction with content; sitting within earshot of a mind dump and dutifully taking notes does not qualify. Yet, while lectures may be poorly suited to the task of learning, this is not true for the person giving the lecture. Most of us can affirm without reservation the truth that you really don't know something until you have had the chance to teach it.

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The practice of teaching emphasizes four activities that extend our mastery of knowledge domain: (1) the organization of content, (2) the articulation of content, (3) reflection on that content through questions and digressions, and (4) the reorganization of the content to make it more accessible and relevant. It is not unlike the process used by students who prepare for tests by reorganizing and rewriting their lecture notes, except that teaching is a whole lot more satisfying. Indeed, one of the prime sources of satisfaction in teaching is the sense that one is doing something useful to help others and participating in an interactive process of knowledge building and empowerment.

There are several interesting technological and pedagogical dimensions associated with implementing the teach-to-learn concept, ranging from the use of peer-to-peer software for creating "massively parallel" virtual classrooms to the thoroughgoing use of assessment rubrics.[3] One of the interesting aspects of the teach-to-learn model is the ability to utilize skill inventories and form internal consulting groups as a scaffolding mechanism for more difficult assignments. In terms of the next-generation CMS, a critical prerequisite of the teach-to-learn model is the need of high-quality and easily implemented synchronous presentation software that avoids a teacher-centered bias. Some current examples of existing software include Macromedia's Breeze® or the use of Groove® in connection with Skype (or another high-quality voice-over-IP tool).

## Concluding Remarks

This chapter presents a heuristic outline of a capabilities approach for the next-generation CMS, focusing on both learner and CMS capabilities. The common thread that runs through this discussion is the importance of thinking through the more profound pedagogical implications of the CMS for student learning—not being content with the traditionally cited gains in administrative efficiency and end-user accessibility.

Can any single CMS package—in this generation or the next—embody these capabilities? Probably not. It is more realistic, at least in the near term, to speak of CMS "solutions" that involve the integration of two or three "off-the-shelf" applications (e.g., one for content publication and grade book management, another for small group collaboration and presence awareness, and perhaps a third for high-quality synchronous presentations). The key is to craft solutions that are elegantly simple and do not impose a substantial tax on professorial time.

Looking ahead, with the future development of fiber optic networks, digital paper, near-flawless voice recognition, holographic imaging, and virtual reality technologies, the potential for implementing discovery-based learning within a 360 degree environment and constructing knowledge assets through a teach-to-learn pedagogy will grow by several orders of magnitude. It is time to eschew the minimalist pedagogical vision of the CMS and to envision a more promising future.

### Notes

1. *www.wikipedia.org*
2. See *www.knowledgeroom.info*
3. See *www.teach2learn.info*

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