Online Collaborative Learning (OCL) Theory

In education, most of the 20th Century was occupied with efforts to shift from a didactic approach focused on the transmission of knowledge and skills to what is popularly called "active learning," where the focus is on students' interest-driven activities that are generative of knowledge and competence. We believe a shift of equal if not greater magnitude will come to dominate educational dialogue in the present [21st] century.

—Scardamalia and Bereiter, 2006

Chapter 6 introduces online collaborative learning and explores:

- The context of online collaborative learning (OCL)
- History of online learning
- Definitions of online learning
  - Online collaborative learning (OCL)
  - Online distance education (ODE)
  - Online courseware (OC)
- OCL theory
  - Discourse, collaboration and knowledge building
  - OCL processes
- OCL pedagogy
  - Three phases of collaborative discourse
Introduction

Chapter 6 focuses on the new field of online learning that has emerged with the invention of computer networking and the concomitant emphasis on collaboration and knowledge building that distinguishes the 21st-century "Knowledge Age." In particular, Chapter 6 introduces online collaborative learning as a framework to guide learning theory and practice within this context. Theories of learning first arose in the 20th century and, as discussed in Chapters 3-5, were primarily linked to didactic pedagogies and use of mechanical and computational technologies of the time. To a significant degree, these learning approaches were based on "right" and "wrong" answers, emphasizing student repetition and replication of the course content. Educational reform in the latter part of the 20th century shifted the emphasis from passive didactic learning approaches toward active learning techniques. The major drivers for educational transformation, however, were yet to come as computer networking, the Internet, and the Web were just being invented.

The invention and widespread adoption of the Internet introduced a paradigmatic shift—a major socio-economic leap in human development, with profound implications for learning. The Internet revolution is the fourth and most recent shift in human development (see Chapter 2) and is the basis for the 21st-century Knowledge Age. The Knowledge Age introduces new and unprecedented learning needs and opportunities that will impact how we view and practice learning. The growth of the Internet has been exponential (becoming increasingly rapid) rather than incremental, and has accelerated the speed and value of knowledge creation today. These changes have set the stage for a new theory of learning that can take into account the ubiquity of the Internet and the societal shift toward collaborative learning emphasizing the building, rather than the transmission, of knowledge.

Knowledge has become the principal component of today's economy, both as a process and as a product. To create knowledge, people need free exchange of information and ideas, free access to accumulated knowledge bases, and opportunities for communication and collaboration. The Internet has provided this access, not just to a select few but worldwide. Together with the transformation of work through the digitalization of labor, the Internet has given rise to a new economy, one based on knowledge work, and has created the need for a society able to understand and create knowledge. Knowledge products are inventions created to solve a problem, whether in the form of a new tool, a new process, or an innovation of an existing technique. The implications for education and for learning are profound and as yet unmapped; they are not, however, unknown or untraveled. As Chapter 6 will examine, the use of the Internet for collaborative knowledge creation is the basis of the Knowledge Age and a new theory of learning with relevance also to the 21st-century workplace. "This is a different age, a Knowledge Age, that has implications not only for the economy but also for society and the education of our children. Ours is a knowledge age as central to our future as the industrial age was to our past. This new age requires new social institutions and new pedagogies," stated Scardamalia and Bereiter (2006, p. 27).

In addition to the new social and economic development, the Internet has also introduced nonformal and informal learning environments and pedagogies that do not require traditional instructional design. Collaborative learning, for example, is a force in contemporary educational practice—with its emphasis on student-centered and participatory learning environments and instructional methods both appropriate and essential for the Knowledge Age [Scardamalia, 2002].

Online Collaborative Learning (OCL) is a form of nonformal learning that uses information and communication technologies to facilitate knowledge creation and sharing. OCL is the new learning paradigm that has been emerging in recent years. In a Knowledge Age, the need for knowledge creation and sharing is pressing, and OCL is the new model for learning in the Knowledge Age. It is the model that is essential for learning in the Knowledge Age [Schank, 2002]. OCL is a form of learning in which multiple individuals come together to create knowledge. It is a form of learning that is designed to support the development of knowledge and understanding in a collaborative setting. OCL is a form of learning that is designed to support the development of knowledge and understanding in a collaborative setting [Schank, 2002].
learning with relevant pedagogies and technologies must respond to this new reality. There is also a significant body of field research to ground new theoretical frameworks. Scardamalia and Bereiter (2006, p. 98) write that:

Our knowledge-creating civilization... Sustained knowledge advancement is seen as essential for social progress of all kinds and for the solution of societal problems. From this standpoint the fundamental task of education is to enculturate youth into this knowledge-creating civilization and to help them find a place in it.

In addition to the focus on youth, it is equally urgent to emphasize education of adults, professional development, and lifelong learning as part of 21st-century educational change. New theories and pedagogies of learning are required for all learners in the Knowledge Age. Twentieth-century models, even constructivist learning theory, have, moreover, been found inadequate in addressing the importance of conceptual change and knowledge building. Active learning as it is defined and practiced falls short in addressing social issues and real problems. The motivation of interest-centered learning can become ad hoc and self-centered or limited. Scardamalia and Bereiter (2006, p. 98) note: "In light of this challenge, traditional educational practice—with its emphasis on knowledge transmission—as well as the newer constructivist methods both appear to be limited in scope if not entirely missing the point."

Online Collaborative Learning (OCL) is proposed here as a new theory of learning that focuses on collaborative learning, knowledge building, and Internet use as a means to reshape formal, nonformal and informal education for the Knowledge Age. OCL responds to 21st-century Knowledge Age requirements and provides a theoretical framework to guide the transformations in instructional design. Moreover, decades of research and practice from around the world indicate that OCL has the potential not only to enhance conventional classroom and distance education but to enable entirely new and better learning options. OCL theory, pedagogies and technologies are presented and explored in this chapter while Chapters 7, 8 and 9 provide case examples and scenarios of OCL in practice.

Chapter 6 is composed of four main sections:

- **Context of Online Collaborative Learning**: This section introduces the context, history and major definitions of online learning. The context provides an overview of the implications for learning of the Knowledge Age. Whereas theories of learning in the 20th-century industrial society emphasized didactic approaches to teaching and learning based on memorization and replication of the curriculum, this section argues that the 21st-century Knowledge Age requires learning that emphasizes collaborative discourse, knowledge creation and use of online communication technologies. Online learning emerged in the late 20th century, but there is a need for sharper definitions of the term: some online approaches echo 20th-century models of knowledge transmission while others, such as OCL, initiate 21st-century approaches to knowledge creation.

- **Online Collaborative Learning Theory** is presented as a theoretical framework to guide learning in the Knowledge Age. Key to OCL is collaborative discourse that supports and advances knowledge-construction activities. Conceptual learning is emphasized along with active engagement. A theoretical framework for OCL is presented, comprising three phases of discourse for intellectual change and knowledge creation: idea generating, idea organizing and intellectual convergence.

- **Online Collaborative Learning Pedagogy** discusses a variety of online pedagogies that can facilitate knowledge building in educational settings, particularly group discussions,
The Net Gen is a collaboration generation. As new applications of these inventions; new ways of doing things as well as doing new things. Be characterized as inventions and innovations: new ideas, solutions, tools and technologies, as well as new applications of these inventions; new ways of doing things as well as doing new things. The current generation of youth has grown up collaborating using online technologies. Tapscott and Williams, authors of the book Wikinomics: How Mass Collaboration Changes Everything, note that the current generation is larger than the baby-boom generation and "through sheer demographic muscle they will dominate the twenty-first century" (p. 46). What the authors call the Net Generation (Net Gen), born since the 1980s, numbers over two billion people. Moreover, the Net Gen is a collaboration generation.

This is the first generation to grow up in the digital age, and that makes them a force for collaboration... The vast majority of North American adolescents know how to use a computer, and almost 90 percent of teenagers in America say they use the Net. The same is true in a growing number of countries around the world... This is the collaboration generation for one main reason: Unlike their parents in the United States, who watched twenty-four hours of television per week, these youngsters are growing up interacting.

Rather than being passive recipients of mass consumer culture, the Net Gen spends time searching, reading, scrutinizing, authenticating, collaborating and organizing... (Tapscott & Williams, 2006, p. 47)

The Net Gen also expends tremendous time and effort in solving problems, creating new ideas and tools and generating intellectual property online. Digital youth are already proficient and prolific in working and interacting online. They do so not for classroom activities but as participants in online multiplayer games and generators of content for social networks.

This is profoundly important because as the 2009 US National Online Survey exploring school district use of Internet and Web 2.0 use in K-12 education noted: "There is a serious and persistent gap between how the digital youth of today learn in school and how they interact and work outside of school" (IESD, 2009). Educators, meanwhile, are confused and unsure of how to proceed. Students are adept of online group work yet classroom work from the school to the university is not significantly predicated on online work or collaboration. Traditional classroom work treats online activities as secondary to the "real" curriculum. Most coursework and homework is individual. And here lies the paradox. Despite the rise of the Internet in the real world, teachers are reluctant to adopt it into the educational world. National studies in the United States have demonstrated that educator attitudes are critical to the growth of any online learning program and key to actually engaging the most promising generation.

**Context of Online Collaborative Learning**

The Knowledge Age both requires and enables knowledge advancement, as a process and a product at a global level. Socio-economic transformations today emphasize processes of innovation over repetition, collaboration over individualistic approaches and knowledge creation over information transmission in how we work and, concomitantly, in how we learn. Knowledge products can be characterized as inventions and innovations: new ideas, solutions, tools and technologies, as well as new applications of these inventions; new ways of doing things as well as doing new things. The current generation of youth has grown up collaborating using online technologies. Tapscott and Williams, authors of the 2006 book Wikinomics: How Mass Collaboration Changes Everything, note that the current generation is larger than the baby-boom generation and "through sheer demographic muscle they will dominate the twenty-first century" (p. 46). What the authors call the Net Generation (Net Gen), born since the 1980s, numbers over two billion people. Moreover, the Net Gen is a collaboration generation.

The 21st-century activist theories emphasize traditional education systems are unchanging, inert institutions of knowledge and their instructional and curriculum design, implementation and assessment.

The Need for 

Twenty-first-century knowledge is needed by all: students, teachers, education researchers, and faculty staff. The framework and its three phases provide a guideline for curriculum design, implementation and assessment.

- **Online Collaborative Learning Technology** focuses on two distinct but complementary components: OCL tools and OCL environments. Each component has a critical role to play, and educators should be aware of the differences and their implications. OCL technological environments, moreover, have distinct attributes that shape and affect the affordances of online educational discourse. Five attributes are identified and explored in relation to their implications for collaborative learning and knowledge-building discourse.
and key to acceptance of online learning theory and pedagogy (Allen & Seaman, 2008). Teacher and faculty support is critical to effecting substantive educational transformation and adoption of online learning, but many teachers are resisting. “More than six years of data from the national Sloan survey of online learning have shown that faculty acceptance of online education has consistently been seen as a critical barrier to its wide-spread adoption” (Allen & Seaman, 2008, p. 1). This is a major conundrum for society. But the solution is not to advocate educational adoption of the Internet without a theory or strategy to guide the pedagogical transformations required. Teachers, trainers and faculty need to understand the educational paradigmatic changes occurring, how educational transformation can address the needs of a Knowledge Age, and how they can develop and implement new pedagogies that are consonant with these realities. This is where a contemporary theory of learning is critical. The educational conundrum cannot be addressed until educators identify with new learning theories and pedagogies that address Knowledge Age realities that they can confidently apply in their classes.

The Need for a New Learning Theory

Twentieth-century education was based on behaviorist, cognitivist and developmental constructivist theories of learning that emphasized learning as an individualistic pursuit. Moreover, the epistemological basis of behaviorism and cognitivism was objectivism. The view of knowledge as unchanging, finite and absolute has implications for teaching: the pedagogies emphasize “transmitting information” as a way to “acquire knowledge,” reflected in such approaches as lectures or their mechanized versions in the form of teaching machines, computer-assisted instruction, intelligent tutoring systems and courseware. This was the ethos of the Industrial Age, an era that emphasized the learner’s ability to acquire and retain information and skills. Teaching students to follow instructions accurately to achieve the desired result was a principal educational goal.

The 21st-century Knowledge Age has introduced an entirely new mindset. Whereas the Industrial Revolution extended and leveraged our physical capabilities to manipulate objects far beyond muscle power alone, the Internet revolution and ensuing Knowledge Age emphasize, extend and leverage our mental capabilities. The Knowledge Age mindset seeks the better or best way to solve a problem, rather than merely following instructions or replicating a textbook answer. This may well require redesign or the new design of a solution. Knowledge is viewed as dynamic and evolving, not static and finite. As global communication has become ubiquitous, our knowledge communities have globalized—becoming more diverse. The speed of intellectual change and knowledge construction has increased—becoming more dynamic. And knowledge has become the marker for the new age—the Knowledge Age. Knowledge, in the form of innovating and creating “know how,” rather than “know to do,” is the basis of today’s society and economy. Knowledge is embedded in software to control machines, modern factories, robotic production, transportation, telecommunications and other wealth-generating enterprises. Production today uses far less physical labor; it uses mental labor. The concept of the knowledge worker has emerged to reflect the nature of work in today’s world. The term “knowledge worker” was coined by Peter Drucker in c.1959 to refer to someone who performs intellectual rather than manual labor. A knowledge worker incorporates his/her education and experience (know-how) to transform information into knowledge. The category of knowledge worker includes those who work in the IT industry, but it is also applied to professionals outside the field of IT, such as scientists, engineers, doctors, lawyers, teachers and students.

The 21st-century Knowledge Age signals the need for a theory of learning that emphasizes knowledge work, knowledge creation and knowledge community. Whereas the 20th-century Industrial-Age learning theories and pedagogies focused on narrow individualistic tasks with simple sets of rules and clear destinations, the 21st-century Knowledge Age emphasizes creative,
conceptual work where there is no clear right or wrong answer, or where there may be many right answers, requiring the knowledge workers to collaborate to identify or create the best option. The role of the instructor or moderator becomes defined as mediating between the learners and the knowledge community, which serves as the state of the art in that discipline.

The educational challenge is not how to create sweeter carrots or sharper sticks, but how to engage learners in creative work with intrinsic rewards, within the context of the Internet and the Knowledge Age, and how to bridge the gap between 21st-century environments and 20th-century pedagogies. New educational designs and pedagogies based on new theories such as OCL provide a basis for addressing Knowledge-Age realities that educators can apply in their work. We begin by considering the history of online learning, in the next section.

**History of Online Learning**

Educational adoption of computer networking, now referred to as online education or online learning, can be traced to the late 1970s and early 1980s. Online education was developed by a few educational innovators: professors in post-secondary education (in the late 1970s and early 1980s); teachers in public schools (early 1980s); and by the mid to late 1980s by educators in the training sector (Harasim, 2002). A variety of online pedagogical approaches were implemented and many were studied. It was, within the small circle of those who adopted this technology for teaching, a time of creativity, but also of research. Most of the early pioneers came from classroom contexts, where they were already exploring new pedagogies such as collaborative learning and knowledge work. They saw opportunities in computer networking and they designed online pedagogies based on a reconceptualization of collaborative classroom learning approaches such as group discussions, seminars and group projects. These efforts were OCL in its infancy or earliest articulation. The opportunity for time- and place-independent group discussion was a powerful catalyst for envisioning dialogue and debate unfettered by access constraints. In the extract below, Starr Roxanne Hiltz, one of the most highly recognized pioneers of online learning, tells how she came to envision a Virtual Classroom:

The term Virtual Classroom™ and the concept was first a gleam in its creator’s eye during a graduate seminar on the Sociology of Architecture, led by Professor Suzanne Keller at Princeton University in 1977. The final assignment was to design “an ideal classroom” for the 21st century. First I sat down and started sketching a set of inter-connected physical spaces for different forms of interaction among people and knowledge resources. In this imagined learning environment there was a multi-media lecture hall, where the Professor pronounces words of Truth and Knowledge, and the students try to absorb this and take notes. In a sumptuously furnished circular “conversation pit” with leather couches and marble coffee tables, the Professor as Discussion Leader and Socrates would conduct seminar-type sessions, moderating discussions and presentations in which the majority of the talking was done by the students. There was also a “learning resources” area, with reference materials, computer hardware and software, and perhaps laboratory equipment, where individuals and small groups of students might do research and prepare their assignments. There were obvious problems. How could you create a comfortable, upholstered discussion space for say, 30 people, without having to put in microphones so that participants could be heard across the huge circle without shouting? How could you possibly provide an adequate amount of computer and other resources, so that they would always be available to students for use in assignments, whenever they wanted them, without the endowment of a Princeton or Harvard?

Suddenly it came to me. A teaching and learning environment did not have to be built of bricks and boards. It could be constructed in software. It could be Virtual! In an era when...
Online education in the 1980s was viewed (if at all) as an educational outsider, certainly not a contender for status quo or mainstream acceptance. By the early to mid-1990s, the scene began to change as the public release of the Internet and the Web increased access. The late 1990s represented a dramatic shift in public recognition and perception of online education: online learning began to be viewed as valid and beneficial, and became increasingly accepted, adopted and mainstreamed.

The shift toward increasing acceptance and adoption of online education has been documented in a series of public reports sponsored by the Alfred P. Sloan Foundation. These reports act as significant barometers of online educational growth and acceptance in the United States. The first report, *Sizing the Opportunity: The Quality and Extent of Online Education in the United States, 2002 and 2003* (Allen & Seaman, 2003), examined the importance of online education at more than 1,000 universities in the United States. When asked to compare the online learning outcomes with those of face-to-face instruction a majority of the respondents (academic leaders and administrators) said that they believed that learning online would soon be better than face-to-face. Two out of every three also responded that online learning was critical to their long-term strategy. The survey also revealed that students were clearly willing to sign up for online courses: over 1.6 million students (11% of all US higher education students) took at least one online course during the fall of 2002. This report marked the beginning of a sea change in the acceptance of online learning. Within a decade, attitudes toward online education had shifted; the perception of online education by academic leaders went from almost zero (or negative) in the early 1990s to more than 20% by the early to mid-1990s. Moreover, for the past several years, online enrollments had been growing substantially faster than overall higher education enrollments: the 2008 figures represented a 20% increase on the number reported the previous year, and far exceeded the 2% growth of the overall higher education student population. Growth of online education was, moreover, not concentrated on a few program offerings but was distributed across almost all disciplines (Allen & Seaman, 2010).

Online learning, according to these reports, came to be viewed as critical to the mission of educational institutions and educators. Allen and Seaman’s (2010) report, *Class Difference: Online Education in the United States, 2010*, represented the eighth annual Sloan report on the state of online learning in US higher education. This study, like those for the previous seven years, was aimed at answering key questions about the nature and extent of online education. The results of the study were based on responses from more than 2,500 colleges and universities. The study found that over 5.6 million students (more than 30% of all higher education students) were taking at least one online course during the fall 2009 term. Moreover, for the past several years, online enrollments had been growing substantially faster than overall higher education enrollments: the 2008 figures represented a 20% increase on the number reported the previous year, and far exceeded the 2% growth of the overall higher education student population. Growth of online education was, moreover, not concentrated on a few program offerings but was distributed across almost all disciplines (Allen & Seaman, 2010).

Studies also demonstrate that a significant number of public school students are taking online courses. While the number of students and the growth rate is less than that of students in
Online learning has mainstreamed, become recognized and valued by the public and has been adopted by educators around the world. The prevailing view as reported by the Sloan studies is that online learning can be as good as or better than classroom education. These reports primarily represent the views of academic leaders and administrators, but nonetheless the number of online courses and students is impressive. Moreover, increasingly, studies are reporting empirical benefits of online learning. A 2009 report on online education prepared for the US Department of Education concluded that “On average, students in online learning conditions performed better than those receiving face-to-face instruction” (Means et al., 2009). The report examined comparative studies of online versus face-to-face classroom teaching from 1996 to 2008, some of which was conducted in K-12 settings but also in colleges and in adult continuing education programs, such as medical training and the military. The report was a meta-analysis of 99 studies that had conducted quantitative comparisons of online and classroom performance for the same courses. The report for the Department of Education found that, on average, students doing some or all of the course online would rank higher than the average classroom student. Barbara Means, the study’s lead author and an educational psychologist at Stanford Research Institute (SRI), was quoted in the New York Times (August 19, 2009): “The study’s major significance lies in demonstrating that online learning today is not just better than nothing—it actually tends to be better than conventional instruction.”

These data are intriguing and important. The report provides powerful data and evidence of the value of learning online. However, the report was not able to link results with pedagogical approaches, since most research studies did not include pedagogical information. The results arguably point to the promise of online learning, and demonstrate that this potential can be met. The challenge is that it is not clear how best to realize the potential of online education. Current benchmarks of traditional face-to-face classroom education are themselves under attack. The big question is what is the bar that education should set for online learning? How and why is online learning better? And at what? Is it enough that online education is better than traditional classroom education? This might suggest that education’s goals are to better accomplish traditional objectives. Yet, the more pressing and profound challenge is to shape online learning to meet the collaborative knowledge needs of the 21st-century Knowledge Age. This creates a new and different set of expectations and perspectives on learning, and drives the development of new designs and objectives for formal and nonformal education.

Teacher training and professional development are essential to help educators gain confidence in adopting online learning; more profound is the need for learning theory to address the new realities and to help shape pedagogical approaches for educators to draw upon as they move to transform their classroom practice and their field. Teachers require evidence-based theoretical frameworks that can be translated into practice and new directions for pedagogy.

For example, the New York Times article reporting the 2009 US Department of Education study of online education was itself unclear about the theory and pedagogy of online learning. The author of the article, Steve Lohr, began by noting that “until fairly recently, online education amounted to little more than electronic versions of old-line correspondence courses.” Moreover, he writes, most schools and universities “use online learning systems primarily for posting assignments, reading lists, and class schedules, and hosting some Web discussion boards.” This is a fair description. However, Lohr goes on to write that: “The real promise of online education, experts say, is providing learning experiences that are more tailored to individual students than is possible in classrooms. That enables more ‘learning by doing,’ which many students find more engaging and useful.”

Arizona State University (ASU) perspective:

The technology is there, people are corrected, they are wrong, activity. Learning

Teachers are being corrected, and this is where guidance

Despite the growing optimism that online education is promising, which pedagogies, approaches, and theories are best for the results. Is it better than nothing? Moreover, does the search for the best approach to learning draw on 20th-century prescriptive instructional models, or on “learning by doing” in 21st-century learning conundrums, which is a common concern (Means et al., 2009). Teachers need guidance and a common sense.

Definitions of Online Learning:

The nature of online learning has been saddled with a variety of terms and definitions. The term “online learning” is often used in lieu of “distance learning,” “Internet-based,” “web-based,” “virtual,” and even the simpler “remote.”

This section addresses the nature of online learning in the major learning environment of today: online courses and programs. At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.

At least three distinguishing characteristics of online learning stand out: Online Collab Courseware (OC) education, but in signing pedagogies and learning outcomes.
and “that new kid on the block,” online courses, have been the subject of studies is that online education has been poorly defined and theorized, with little explication of which pedagogies, approaches, tools and environments should be used, under what conditions, for the best results. In fact, a very important issue is what kinds of results should teachers be seeking? Moreover, do results link with process? Should teachers consider a more individualized approach to learning or one based on learning communities? Should new educational models draw on 20th-century behaviorist and cognitivist approaches, which focus on individualized, prescriptive instructional designs? Is the focus on constructivist learning activities, with the emphasis on “learning by doing”? What kinds of process and products/outcomes are relevant and necessary in 21st-century learning and how are these related to Knowledge-Age work and society? This conundrum, which is at base a lack of clear definition and strategy, may explain why the most common concern cited by the Sloan studies thus far has been related to faculty acceptance (Allen & Seaman, 2007). Teachers do not have the necessary tools, training or understanding of the next steps. They need guidelines framed by theory.

Definitions of Online Learning

The nature of online learning—the new kid on the block—is poorly understood and has been saddled with a variety of contradictory definitions that paint a conflicting set of processes and outcomes. The term has been applied to almost any educational activity that uses email or Web access, even the simple posting of lecture notes, student grades or PowerPoint slides online. This section addresses the need to define online learning by identifying the different and contradictory learning models that have been encompassed within this term. Being able to identify the major learning models associated with learning online will assist educators in interpreting research or field results by understanding the pedagogy or process underlying the approach that led to those outcomes (for example, outcomes such as drop-out rates, user satisfaction, learning effectiveness or costs). Different online learning models lead to different results. Hence, understanding the underlying theoretical frameworks will help guide educators to better design their pedagogical approaches and to select the most appropriate technologies to implement effective online courses and activities.

At least three distinct models have been commonly subsumed under the title of “online learning”: Online Collaborative Learning (OCL), Online Distance Education (ODE) and Online Courseware (OC) (Harasim, 2002). The three approaches each use the Internet and the Web for education, but in significantly different ways and with major differences in learning theory, learning pedagogies and learning technologies. OCL, for example, employs a significant teacher role and an emphasis on student discourse and collaboration; ODE uses a correspondence model of course delivery, self-study and individual communication with a tutor; OC is based on individualized learning with courseware without instructor or peer interaction.
These three approaches are described below.

ONLINE COLLABORATIVE LEARNING (OCL)

OCL refers to educational applications that emphasize collaborative discourse and knowledge building mediated by the Internet; learners work together online to identify and advance issues of understanding, and to apply their new understanding and analytical terms and tools to solving problems, constructing plans or developing explanations for phenomena. OCL emphasizes processes that lead to both conceptual understanding and knowledge products. OCL is based on peer discourse that is informed by the processes and resources of the knowledge community and facilitated by the instructor as a representative of that knowledge community. Most commonly, the discourse is text-based and asynchronous, taking place in a web-based discussion forum or computer conferencing system. OCL also uses multimedia technologies such as graphics or video to enhance the discourse. Educational applications may be offered synchronously instead of or in addition to asynchronous communication. The role of the instructor is key: the teacher structures the discussions into small or large groups around knowledge problems. The teacher is not merely a facilitator of the group discourse but acts as a mediator between the students and the larger knowledge community that he or she represents, and helps to induct the learners into the debates and research processes of that knowledge community. OCL theory and pedagogy are discussed in more detail in a subsequent section, illustrated with examples.

ONLINE DISTANCE EDUCATION (ODE)

ODE is primarily based on traditional 19th- and 20th-century correspondence education models, but replaces postal-mail delivery with the cheaper, faster and more efficient email delivery of course materials and tutor feedback.

Romiszowski and Ravitz (1997, pp. 755–756), in discussing online learning, make a valuable distinction between the "conversational" paradigm (which we can identify as OCL) and the "instructional" paradigm (termed here as ODE):

It may help to compare and contrast two alternative paradigms, or maybe philosophies, which can be seen in the real-world practice of education—we shall refer to them as the "instructional" and the "conversational" paradigms... The "instructional" paradigm is the one that has driven much (though by no means all) of the research and development of the past 30 years that has been performed under the label of educational (or instructional) technology.

The "conversational" paradigm may be seen as much of the work done on small group study, group dynamics, experiential learning and so on. In relation to distance teaching specifically, one may notice... that the self-instructional "study module" or typical correspondence course may serve as a good example of the instructional paradigm.

As Romiszowski and Ravitz note, the use of online communication by distance education providers has been based on the "instructional technology" model, rather than what they call the collaborative "conversational" model. The ODE approach reflects the cognitivist learning theory and pedagogies based on self-study and individualized learning modules discussed in Chapter 4.

Nonetheless, many institutions that employ ODE are beginning to incorporate OCL into their course design, thereby moving toward what may be described as a blended pedagogical model (OCL + ODE). This shift from ODE to increasingly OCL pedagogy is, more importantly, moving online learning into the conversationalist paradigm. A significant component of the course becomes the group discourse, while the instructional aspect is an informational self-study component.

ONLINE COURSES

OC (also known as "online collaborative learning") refers to educational applications that emphasize collaborative discourse and knowledge building mediated by the Internet; learners work together online to identify and advance issues of understanding, and to apply their new understanding and analytical terms and tools to solving problems, constructing plans or developing explanations for phenomena. OC emphasizes processes that lead to both conceptual understanding and knowledge products. OC is based on peer discourse that is informed by the processes and resources of the knowledge community and facilitated by the instructor as a representative of that knowledge community. Most commonly, the discourse is text-based and asynchronous, taking place in a web-based discussion forum or computer conferencing system. OC also uses multimedia technologies such as graphics or video to enhance the discourse. Educational applications may be offered synchronously instead of or in addition to asynchronous communication. The role of the instructor is key: the teacher structures the discussions into small or large groups around knowledge problems. The teacher is not merely a facilitator of the group discourse but acts as a mediator between the students and the larger knowledge community that he or she represents, and helps to induct the learners into the debates and research processes of that knowledge community. OC theory and pedagogy are discussed in more detail in a subsequent section, illustrated with examples.

ONLINE COLLABORATIVE LEARNING (OCL)

OCL refers to educational applications that emphasize collaborative discourse and knowledge building mediated by the Internet; learners work together online to identify and advance issues of understanding, and to apply their new understanding and analytical terms and tools to solving problems, constructing plans or developing explanations for phenomena. OCL emphasizes processes that lead to both conceptual understanding and knowledge products. OCL is based on peer discourse that is informed by the processes and resources of the knowledge community and facilitated by the instructor as a representative of that knowledge community. Most commonly, the discourse is text-based and asynchronous, taking place in a web-based discussion forum or computer conferencing system. OCL also uses multimedia technologies such as graphics or video to enhance the discourse. Educational applications may be offered synchronously instead of or in addition to asynchronous communication. The role of the instructor is key: the teacher structures the discussions into small or large groups around knowledge problems. The teacher is not merely a facilitator of the group discourse but acts as a mediator between the students and the larger knowledge community that he or she represents, and helps to induct the learners into the debates and research processes of that knowledge community. OCL theory and pedagogy are discussed in more detail in a subsequent section, illustrated with examples.

ONLINE DISTANCE EDUCATION (ODE)

ODE is primarily based on traditional 19th- and 20th-century correspondence education models, but replaces postal-mail delivery with the cheaper, faster and more efficient email delivery of course materials and tutor feedback.

Romiszowski and Ravitz (1997, pp. 755–756), in discussing online learning, make a valuable distinction between the "conversational" paradigm (which we can identify as OCL) and the "instructional" paradigm (termed here as ODE):

It may help to compare and contrast two alternative paradigms, or maybe philosophies, which can be seen in the real-world practice of education—we shall refer to them as the "instructional" and the "conversational" paradigms... The "instructional" paradigm is the one that has driven much (though by no means all) of the research and development of the past 30 years that has been performed under the label of educational (or instructional) technology.

The "conversational" paradigm may be seen as much of the work done on small group study, group dynamics, experiential learning and so on. In relation to distance teaching specifically, one may notice... that the self-instructional "study module" or typical correspondence course may serve as a good example of the instructional paradigm.

As Romiszowski and Ravitz note, the use of online communication by distance education providers has been based on the "instructional technology" model, rather than what they call the collaborative "conversational" model. The ODE approach reflects the cognitivist learning theory and pedagogies based on self-study and individualized learning modules discussed in Chapter 4.

Nonetheless, many institutions that employ ODE are beginning to incorporate OCL into their course design, thereby moving toward what may be described as a blended pedagogical model (OCL + ODE). This shift from ODE to increasingly OCL pedagogy is, more importantly, moving online learning into the conversationalist paradigm. A significant component of the course becomes the group discourse, while the instructional aspect is an informational self-study component.

As Romiszowski and Ravitz (1997, pp. 755–756), in discussing online learning, make a valuable distinction between the "conversational" paradigm (which we can identify as OCL) and the "instructional" paradigm (termed here as ODE):

It may help to compare and contrast two alternative paradigms, or maybe philosophies, which can be seen in the real-world practice of education—we shall refer to them as the "instructional" and the "conversational" paradigms... The "instructional" paradigm is the one that has driven much (though by no means all) of the research and development of the past 30 years that has been performed under the label of educational (or instructional) technology.

The "conversational" paradigm may be seen as much of the work done on small group study, group dynamics, experiential learning and so on. In relation to distance teaching specifically, one may notice... that the self-instructional "study module" or typical correspondence course may serve as a good example of the instructional paradigm.

As Romiszowski and Ravitz note, the use of online communication by distance education providers has been based on the "instructional technology" model, rather than what they call the collaborative "conversational" model. The ODE approach reflects the cognitivist learning theory and pedagogies based on self-study and individualized learning modules discussed in Chapter 4.

Nonetheless, many institutions that employ ODE are beginning to incorporate OCL into their course design, thereby moving toward what may be described as a blended pedagogical model (OCL + ODE). This shift from ODE to increasingly OCL pedagogy is, more importantly, moving online learning into the conversationalist paradigm. A significant component of the course becomes the group discourse, while the instructional aspect is an informational self-study component.

As Romiszowski and Ravitz note, the use of online communication by distance education providers has been based on the "instructional technology" model, rather than what they call the collaborative "conversational" model. The ODE approach reflects the cognitivist learning theory and pedagogies based on self-study and individualized learning modules discussed in Chapter 4.

Nonetheless, many institutions that employ ODE are beginning to incorporate OCL into their course design, thereby moving toward what may be described as a blended pedagogical model (OCL + ODE). This shift from ODE to increasingly OCL pedagogy is, more importantly, moving online learning into the conversationalist paradigm. A significant component of the course becomes the group discourse, while the instructional aspect is an informational self-study component.

As Romiszowski and Ravitz note, the use of online communication by distance education providers has been based on the "instructional technology" model, rather than what they call the collaborative "conversational" model. The ODE approach reflects the cognitivist learning theory and pedagogies based on self-study and individualized learning modules discussed in Chapter 4.

Nonetheless, many institutions that employ ODE are beginning to incorporate OCL into their course design, thereby moving toward what may be described as a blended pedagogical model (OCL + ODE). This shift from ODE to increasingly OCL pedagogy is, more importantly, moving online learning into the conversationalist paradigm. A significant component of the course becomes the group discourse, while the instructional aspect is an informational self-study component.
ONLINE COURSEWARE (OC)

OC (also known as Online Computer-Based Training) refers to the use of courseware (prepackaged content) that a learner accesses online. The learner uses an individualized self-paced pedagogy to interact with the courseware content, which is presented in a modular format. Upon completion of each module, the student takes a post-test (typically a multiple-choice test that can be computer graded) to assess his or her understanding of the content and to provide remedial action if the student fails the post-test. OC began as the use of Intelligent Tutoring System software that was posted on the Web. Online courseware is now designed specifically for web-based applications. Online course authoring software to build and customize OC content is being developed in the nonformal training sector.

OC, like ODE, is an example of instructional technology based on cognitive learning theory (discussed in Chapter 4). OC is based on a prescriptive model of instructional design emphasizing individualized learning pedagogies. There is no discourse among peers, or with a tutor or instructor. OC is most commonly employed in the training sector, where it represents a major investment by large corporations, governments and the military. However, some OC providers are beginning to supplement this training approach with OCL and peer interaction in order to reduce high drop-out rates, to better motivate and engage learners and to emphasize understanding over retention of facts. Researchers and trainers in the field of courseware are expressing the need to shift away from stand-alone instructional devices and toward using tools to aid in the more collaborative learning process (Shute & Psotka, 1996, p. 595).

Table 6.1 outlines the basic characteristics of each type or category of online learning that has been discussed in the previous sections. It highlights the distinctive as well as common characteristics.

Having briefly introduced and distinguished the three major categories within the umbrella term "online education," the remainder of the chapter discusses OCL theory, pedagogy and technologies.

Online Collaborative Learning Theory

Online collaborative learning (OCL) theory addresses the needs and opportunities of the Knowledge Age. Ours is a knowledge-creating age and our theories and practice of learning are challenged to move beyond didactic and even active learning approaches to enable learners to become knowledge builders. Knowledge building is a term now widely used. Scardamalia and Bereiter (2006, p. 113) note that: "we were, as far as we can ascertain, the first to use the term in education, and certainly the first to have used it as something more than a synonym for active learning." The authors distinguish knowledge building as distinct in important ways from such terms as "active learning," "self-regulated learning" and "learning by doing."

<table>
<thead>
<tr>
<th>Table 6.1 Three Types of Online Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Online Collaborative Learning</strong></td>
</tr>
<tr>
<td>- Online discourse</td>
</tr>
<tr>
<td>- Group learning</td>
</tr>
<tr>
<td>- Instructor-led</td>
</tr>
<tr>
<td>- Asynchronous</td>
</tr>
<tr>
<td>- Place-independent</td>
</tr>
<tr>
<td>- Text-based</td>
</tr>
<tr>
<td>- Internet-mediated discourse</td>
</tr>
<tr>
<td><strong>Online Distance Learning</strong></td>
</tr>
<tr>
<td>- Online delivery</td>
</tr>
<tr>
<td>- Individualized learning</td>
</tr>
<tr>
<td>- Tutor support</td>
</tr>
<tr>
<td>- Asynchronous</td>
</tr>
<tr>
<td>- Place-independent</td>
</tr>
<tr>
<td>- Text-based</td>
</tr>
<tr>
<td><strong>Online Courseware</strong></td>
</tr>
<tr>
<td>- Online presentation</td>
</tr>
<tr>
<td>- Individualized learning</td>
</tr>
<tr>
<td>- Computer assessment</td>
</tr>
<tr>
<td>- Asynchronous</td>
</tr>
<tr>
<td>- Place-independent</td>
</tr>
<tr>
<td>- Multimedia</td>
</tr>
<tr>
<td>- Internet-mediated presentation</td>
</tr>
</tbody>
</table>
OCL theory provides a model of learning in which students are encouraged and supported to work together to create knowledge: to invent, to explore ways to innovate and, by so doing, to seek the conceptual knowledge needed to solve problems rather than recite what they think is the right answer. While OCL theory does encourage the learner to be active and engaged, this is not considered to be sufficient for learning or knowledge construction. Terms or techniques such as "active learning" or "learning by doing" imply that students' interest-driven activities are generative of knowledge and competence. Self-regulation, moreover, is an individualized learning strategy to teach a learner better control over his/her behavior; it typically emphasizes self-observation, self-monitoring and self-evaluation. But these approaches do not necessarily lead students to conceptual change or to construct knowledge. In the active learning model, the role of the teacher is not considered, and is sometimes diminished to being a participant. In the OCL theory, the teacher plays a key role not as a fellow-learner, but as the link to the knowledge community, or state of the art in that discipline. Learning is defined as conceptual change and is key to building knowledge.

Learning activity needs to be informed and guided by the norms of the discipline and a discourse process that emphasizes conceptual learning and builds knowledge. There is a need for students to have a relationship to the knowledge community, mediated by the teacher or mentor who represents that community. In OCL, the teacher has a very important role to play. Moreover, learning and knowledge building should be viewed as meaningful to society and not driven only by personal interest or done to fulfill a class assignment.

Discourse, Collaboration and Knowledge Building

A key aspect of knowledge creation is discourse. Discourse refers to written or spoken discussion and conversation. Discourse is also posited as the very catalyst for our civilizational development, the basis of thought, knowledge and civilization. Speech is the first paradigm shift (see Figure 2.2), and speech as the basis of thought also draws upon Vygotsky's views that reflective thought is internalized conversation (inner speech). Vygotsky's 1962 book, *Thought and Language*, makes the argument that thought is inner conversation with ourselves, a collaboration turned inward: "The relation between thought and word is a living process; thought is born through words. A word devoid of thought is a dead thing, and a thought unembodied in words remains a shadow" (p. 153).

Vygotsky was an early and major force in advancing the importance of collaboration for knowledge construction; he revised learning theory by moving the unit of analysis from the individual per se, to the individual in relationship to the environment and in interaction with others. He defined learning as a social process, based on language, conversation and the "zone of proximal development" (ZPD), whereby we learn through contact and discourse with an adult or peer more competent in the field. Bruffee (1999) writes along the same line: "We think because we can talk with one another" (p. 134). Knowledge is generated by speech and conversation with one another, a construct of the community's form of discourse, negotiated and maintained by local consensus and subject to endless conversation (Bruffee, 1999; Kuhn, 1970). "Education initiates us into conversation, and by virtue of that conversation initiates us into thought" (Bruffee, 1999, p. 133).

Collaboration and discourse are key to building knowledge, an endless human conversation of changing and improving ideas. Academic disciplines as well as the whole of work reflect the growing recognition of collaboration in human development. Anthropologists have come to view intentional collaboration as being at the very core of human identity and the essence of civilizational advancement (Hrdy, 2009). Invention and knowledge are perceived not as products of individual genius, but of knowledge communities and collaboration. Michael Farrell (2001) defines the term "collaborative circles" as follows:

Figure 6.1 Examples

A primary group may extend long periods of work. The view of what constitutes thought about the knowledge of scientists, is...

Kenneth Bruffee explains construction. He concludes, scientists consider a kind of conversation; tell us, are "collaboration"...

OCL theory and professional (course) used by Kenneth Bruffee observed, discussions to the next as we build...

From the very people. When certain ways we talk with people, community that justly...

In fact, popular standards but true. It is also t...
A primary group consisting of peers who share similar occupational goals and who, through long periods of dialogue and collaboration negotiate a common vision that guides their work. The vision consists of a shared set of assumptions about their discipline, including what constitutes good work, how to work, what subjects are worth working on, and how to think about them. For a group of artists, the shared vision might be a new style. For a group of scientists, it might be a new theoretical paradigm. (p. 11)

Kenneth Bruffee (1999) similarly emphasizes the importance of collaboration for knowledge construction. He cites the studies of Bruno Latour and Steve Woolgar, who concluded that scientists construct scientific knowledge through conversation, and that the most important kind of conversation scientists engage in is indirect, that is, displaced into writing. Scientists, they tell us, are “compulsive and almost manic writers.” Conversation among scientists illustrates, furthermore, how we construct knowledge in every field and walk of life. (Bruffee, 1999, p. 53)

OCL theory and pedagogy seek to initiate the learners into the processes of conversation (discourse) used by knowledge communities to create knowledge and improve ideas. As Bruffee has observed, discourse is the means of transitioning from one community of knowledgeable peers to the next as we become reacclimated through engagement with each new community.

From the very beginning of our lives we construct knowledge in conversation with others. When we learn something new, we leave a community that justifies certain beliefs in certain ways with certain linguistic and paralinguistic systems, to join instead another community that justifies other beliefs in other ways with other systems. We leave one community of knowledgeable peers and join another. (Bruffee, 1999, p. 135)

In fact, popular statements such as “Science is talk” or “Science is argument” may be simplistic but true. It is also true within art and social and cultural sciences, and for all forms of knowledge.
and education as well. Knowledge is built by and through informed discourse, debate, agreement and disagreement about new information.

Collaborative learning refers to ways of teaching and learning based on talk, on discourse whereby students co-labor to produce a result whether to solve a problem, to discuss or improve an idea, explore a hypothesis or conduct a project (Harasim, 2004). However, unlike "cooperative learning" in which each group member contributes an independent piece to the whole in the form of a division of labor, with "collaborative learning" the group members discuss and work together throughout the process. The process itself is collaborative, not just the product. The process is one of conceptual change, in which learners in a shared context (a course, a seminar, or a discussion) engage in a process of progressing from divergent to convergent perspectives and understanding. Intellectual divergence such as individual brainstorming, disagreeing, debating, eventually leads, with facilitation, to considering new ideas and exploring the merits of the different perspectives generated by the others in the group. Through the role of the teacher or moderator and access to new sources of information, the group arrives at a position of intellectual convergence, a group position (albeit not homogenous) that reflects a deeper understanding of the content and also of the process of knowledge and possibly even contributes to practice or advancing the state of the art.

The primary role of discourse in knowledge communities is to not merely persuade but to generate progress toward the solution of shared problems. Scardamalia and Bereiter (2006, p. 100) propose the following criteria for knowledge-building discourse in a classroom:

- a commitment to progress, something that does not characterize dinner party conversation or discussions devoted to sharing information and venting opinions;
- a commitment to seek common understanding rather than merely agreement, which is not characteristic of political and policy discourse, for instance;
- a commitment to expand the base of accepted facts, whereas, in court trials and debates, attacking the factual claims of opponents is common.

**Online Collaborative Learning Processes**

The OCL process includes discourse, collaborative learning and knowledge building. Innovation and creativity are essential to building knowledge, and are key aspects of divergent thinking. Divergent thinking refers to a process that generates many questions, ideas, responses or solutions. It is associated with brainstorming and creative thought, that is, generating questions and drawing on ideas from different perspectives and many sources (including personal observations and experiences). While divergent thinking involves generating many ideas, the process associated with identifying the best ideas and discarding the weak ones is called convergent thinking. Convergent thinking refers to narrowing down the options based on existing information and analysis, and selecting the best. Linus Pauling, the great scientist who won two Nobel prizes in his lifetime, was credited with the following response when asked at a public lecture how one creates scientific theories: Pauling replied that one must endeavor to come up with many ideas—then discard the useless ones.

Determining the best solution involves considering many ideas and learning most appropriate to apply to the situation. The OCL theory has been characterized by Harasim (1996a, 2002) as comprising three processes/phases, describing a path from divergent to convergent thinking. Although identified and developed in the online context, it resonates with Bruffee’s (1999) theoretical position that intellectual convergence through collaborative discourse is key. Jeremy Roschelle (1992) similarly posits that collaboration can lead to convergence of meaning. He studies how two or more people can construct shared meanings for conversations, concepts and experiences:
debate, agree-

One compelling reason for exploring a convergence account as a complement to Piagetian and Vygotskian accounts follows from a fundamental commitment to collaborative inquiry, and the relation of collaborative inquiry to scientific conceptual change. Democratic participation, intellectual progress and gradual convergence are base attributes of social inquiry practices that enable scientists to undergo conceptual change. In contrast, Vygotskian theory lends itself to accounts of the reproduction of existing scientific knowledge, whereas Piaget suggests development through static, maturational levels. A convergence account alone suggests the attractive possibility that students develop their concepts in the course of learning to participate in the practices of inquiry that scientists themselves use to develop scientific concepts. (Roschelle, 1992, p. 272)

Harasim (2002) proposes the OCL theory of discourse in online educational applications and identifies the following three intellectual phases as key:

1. Idea Generating. The first phase, Idea Generating, refers to divergent thinking within a group; brainstorming, verbalization, generating information, and thus sharing of ideas and positions on a particular topic or problem. Participants engage in democratic participation and thereby contribute toward building a large and diverse set of ideas and perspectives.

2. Idea Organizing. The second phase, Idea Organizing, is the beginning of conceptual change, demonstrating intellectual progress and the beginning of convergence as participants confront new or different ideas, clarify and cluster these new ideas according to their relationship and similarities to one another, selecting the strongest and weeding out weaker positions (referencing, agreement, disagreement or questioning). This phase demonstrates intellectual progress through recognizing multiple perspectives and identifying how these relate or not to one another and to the topic.

3. Intellectual Convergence. The third phase, Intellectual Convergence, is typically reflected in shared understanding (including agreeing to disagree), a mutual contribution to and construction of shared knowledge and understanding. Idea structuring, through gradual convergence, reaches a level of intellectual synthesis, understanding and consensus, whereby participants in the discussion agree to disagree, and/or co-produce a conclusion—perhaps an artifact such as a solution to a problem, a design, an assignment, a theory, a publication, a work of art, or a similar output co-authored by the group or subgroup.

Figure 6.2 illustrates the three stages of collaborative discourse from Idea Generating (IG) to Intellectual Convergence (IC). At the IG stage, individual students contribute their ideas and opinions to the group. Through the process of brainstorming, the students express their own ideas and begin to confront other ideas as generated by others in the group. This leads to the second stage of the discourse—Idea Organizing (IO). At this stage, the students reflect on the various ideas presented and begin to interact with one another to agree or disagree, clarify, question, critique, elaborate or reject some ideas and identify relationships and organizing linkages among other ideas. As a result, discrete ideas start to come together; several small ideas become a few large ones, individual understandings grow into group-shared understanding. And many ideas are discarded. At this point, the discourse advances to the third level—IC. By stage 3, the group actively engages in the co-construction of knowledge based on shared understandings. The group members synthesize their ideas and knowledge into explicit points of view or positions on the topic. The outcomes of this stage are consolidated, shared understandings and
group convergence as evidenced by conclusive statements and/or co-production (such as theories, positions, strategies, tools, manifestos and scientific theories/hypotheses). These may lead to social applications, represented as gears. Or lead to further debate, discussion and refining of the concepts as suggested by the feedback arrows. The process is not circular, but one of continual growth or advance based on a feedback spiral. The phase of IO may move directly to IC, or it may trigger further brainstorming (IG). The role of the teacher/moderator is highlighted and discussed in the next section, on OCL pedagogy.

**Online Collaborative Learning Pedagogy**

Online learning has been adopted at all levels of education, from public schools and universities to training and continuing and corporate education. Many educators have tried totally online or blended classroom teaching. Online education is becoming ubiquitous, increasingly integrated into traditional classroom and distance education programs.

The major challenge and paradox, as discussed earlier in this chapter, is the need for a theory of learning and concomitant pedagogies that speak to the realities of the Knowledge Age. Teaching approaches and techniques for online education do exist, as evidenced by the growth of the field. Literature on how to design and moderate online seminars and projects is emerging and these books provide many valuable examples and techniques (see for example, books by Palloff & Pratt, 2001, 2005, 2007; Salmon, 2000; Collison et al., 2000).

OCL theory can enrich or contribute to the above pedagogical activities by providing a theoretical framework to help design and inform activities such as online seminars and group work with processes of conceptual change and intellectual convergence. OCL theory can also help in assessing conceptual change. OCL pedagogy emphasizes conceptual change and learning through advancing from the Idea Generating stage, to Idea Organizing, to the Intellectual Convergence stage. The pedagogical activities are linked with conceptual processes that encourage change and improvement over time.

In OCL theory and pedagogy, the teacher plays a key and essential role, a role that is neither as “guide on the side” nor “sage on the stage.” Rather, the role of the educator is to engage the learners in the language and activities associated with building the discipline, inducting the learners into the language and processes of the knowledge community. Teachers are representatives of their knowledge communities, and as such introduce the learners to the appropriate language as well as its application within the particular discipline.
Everybody in such a knowledge community "speaks the same language," the language that constitutes the community. Among academic and public professionals alike, a major element in this constituting language is what to outsiders seems like jargon, the disciplinary locations and terms of art that add up to the normal discourse of the community. Speaking that language fluently defines membership in the community. Not speaking it fluently marks a nonmember. Mathematicians speak fluent mathematics. Nonmathematicians do not. Sociologists speak fluent sociologese. Nonsociologists do not.... Thomas Kuhn has argued and Bruno Latour and others have confirmed that this principle extends as well to scientific thought and scientific communities. (Bruffee, 1999, pp. 153–154)

Teachers, professors and educators are members of their knowledge community and have the special role of representing that community and of inducting new members.

In accepting this responsibility, professors set out to help students acquire fluency in the language of those communities, so that they become, if not necessarily new professionals, then people who are "literarily-minded," "mathematically-minded," "sociologically-minded," and so on. That is, the students learn more than disciplinary jargon. Their education is reacclimation involving intense, flexible linguistic engagement with members of communities they already belong to and communities to which they do not yet belong. (Bruffee, 1999, p. 154)

To help illustrate this intellectual process, we examine a generic online group discussion or seminar approach, which begins with small group discussions on a topic, then progresses.

Figure 6.3 depicts the pedagogy of group discussion and the progress from divergence to intellectual convergence that approximates the knowledge community. The role of the teacher is as facilitator with the students and as representative of the knowledge community, reacclimating the students into the discourse of the knowledge community of that discipline.

---

**Figure 6.3 Example OCL Processes in a Class.**
We can view this process exemplified by a group discussion (or seminar, debate, etc.).

1. Idea Generating. Learners engage in a group discussion of a specific topic, question or knowledge problem in the discipline that they are studying. Each participant logs on to the discussion to present his or her initial views on the subject. This is the process of idea generating and brainstorming, whereby participants articulate their views and generate a range of divergent perspectives on the topic. The teacher or moderator establishes the processes of discussion and the knowledge problem to be discussed. This phase is a highly democratic and engaging process: everyone presents one or several ideas.

2. Idea Organizing. Students interact with one another, confront new ideas and engage in relevant course readings suggested by the teacher/moderator and other sources of information proposed by group members. The input has grown and has enriched each learner’s awareness and appreciation of how the topic can be viewed. Learners begin to organize, analyze and filter the range of ideas by agreeing or disagreeing with some of the ideas presented, elaborating, expanding or rejecting others. Inputs from the teacher/moderator such as course readings and facilitating the discussion reflect the influence of the knowledge community as the framework of reference. The teacher introduces new analytical terms which are applied by the students to deepen the discussion and understanding of the topic. Some idea generating may occur but primarily this phase of the process is characterized by references to ideas and applying analytical concepts to cluster or organize common ideas into fewer and more refined categories.

3. Intellectual Convergence. Through informed discussion and analysis informed by the readings and supported by the teacher/moderator, learners reach a level of intellectual convergence and come to a position on the topic or a resolution to the knowledge problem. Intellectual convergence includes (and is most typically characterized by) agreement to disagree or in some cases reaching a consensus. Intellectual convergence may be reflected in a co-produced final product such as a report, a final paper, a group presentation or an intellectual statement such as a summary or landscape of the discussion. When a product is the goal (a paper, a presentation, a project or assignment), the intellectual processes aim toward a consensus on the shape of the final product. In more scholarly applications, the goal may be development of a design, a policy, an artistic or scientific statement. Or the process of convergence may yield a few key but distinct positions.

The process of moderated group discussion in an educational forum is to provide students with access to the most relevant and timely information sources, to learn the analytical terms and concepts of the discipline and how to apply these appropriately, and to arrive at a position informed by the process. Students have engaged in learning and constructing knowledge by using the processes used by the knowledge community in that discipline, and thus approximate the processes employed by that knowledge community. The role of the teacher has been to mediate between the students and the knowledge community, representing the knowledge community by assisting access to state-of-the-art information on the topic and facilitating the collaboration and knowledge-building processes. In a course, the process will likely end here, a final paper or project applying the conclusions. Or possibly the process may repeat, in a loop or a spiral, to deepen the intellectual processes. Another option is that the process leads to real-world applications, such as a course involving preservice or inservice training.

4. Final Position. The process encourages conceptual change. It may trigger further consideration and analysis by recycling (at an ever deeper or more advanced level) intellectual processes of learning and problem-solving, as they confront new terms and apply new knowledge with an existing view of how the topic and knowledge problem and how they wish to gain entry, understanding.

This example takes on the view of the learner as they confront new terms and apply new knowledge with an existing view of how the topic and knowledge problem and how they wish to gain entry, understanding.

The role of the teacher in this process is to help the learners access the resources and knowledge available via the Internet. Key aspects include providing an understanding of the resources and knowledge available via the Internet. Key aspects include providing an understanding of the resources and knowledge available via the Internet. Key aspects include providing an understanding of the resources and knowledge available via the Internet. Key aspects include providing an understanding of the resources and knowledge available via the Internet.
processes of Idea Generating and Idea Organizing or in other cases, such as applied sciences and professions, the final conclusions may be decisions or strategies to influence real-world applications.

This example takes into consideration the process of reacculturation that learners experience as they confront new problems or new perspectives on an existing problem, learn new analytical terms and apply new analytical processes to problem solving. Learners typically enter the course with an existing view on a topic or problem. Through group discussion and interaction with the teacher and information resources, they come to a new and deeper understanding of the knowledge problem and how to address it in the manner of the knowledge community to which they wish to gain entry, upon graduation.

The role of the teacher is essential to facilitating the process and providing the learners with the resources and kinds of activities that will help them to build knowledge collaboratively, using the Internet. Key as well is the role of the knowledge community, which represents the state of the art in that discipline. The teacher or professor, as a representative of that knowledge community,
mediates between the learners and the knowledge community and inducts the learners into the processes for building knowledge in that discipline. Collaborative learning discourse and processes contribute to the growth of understanding and knowledge in a cyclical or spiral manner (not linear), progressing and improving through experience, discussion and new information over time.

**Online Collaborative Learning Technology**

The nature of online technologies is another key to understanding and engaging in effective online learning. Online technologies can play various and very distinct roles. Some online technologies facilitate learning tasks while others facilitate learning processes. The former are referred to as online tools, the latter as online environments.

The next two sections discuss in greater detail online learning technology's essential roles:

1. Technology as learning tool(s);
2. Technology as learning environment.

**Online Learning Tools**

The concept of online learning tools refers to web tools that can facilitate or enable particular tasks in a learning activity. These may be tools generic to the Web or education-specific tools. Educators and learners use both. Generic web tools include search engines such as Google, web browsers for accessing the Web, email tools, productivity tools such as online calendars, document-creation tools and graphic presentation tools. Generic tools associated with Web 2.0 (also referred to as the Social or Collaborative Web) include blogs, wikis, podcast-authoring tools, web-authoring tools, social networking tools and tools to enable social networking by user-generated content.

Education-specific tools include websites or portals with resources specifically aimed at teachers, students or particular disciplines: for example, sites that offer lesson plans; assessment information, tools or inventories; learner support or tutoring; content for specific disciplines and age levels; and/or links to related sites. Other online tools that are popular with educators are online gradebooks, online quizzes, web portals that contain course materials and (audio and/or video) podcasts.

Nonetheless, such tools do not provide online "spaces" conducive to facilitating collaborative learning. They offer potential enhancements to collaborative discourse and group conversations, but they are not shared spaces or environments, able—in and of themselves—to support collaborative learning and knowledge building discourse. Blogs, wikis and social networks are excellent for their purposes as diaries, collaborative-authoring tools or social spaces, but they were not designed for nor are they appropriate as learning environments which can support group discussion that deepens and progresses over time.

Web tools are important pieces in the learning process, but attempts to date to concatenate the tools to form an environment for learning, such as linking a gradebook with a quiz tool, are inadequate for effective learning. Central to collaborative learning and knowledge building is the need for a shared space for discourse and interaction. This shared space is the heart of an online learning environment that can support OCL.

**Online Learning Environments**

The term online learning environment refers to web-based software that is designed to host or house the learning activities. An online learning environment is the online equivalent of physical architecture such as a classroom, a campus, a student cafe, a seminar room, a student lab or office. Allen and Otto (1996) refer to the educational ecology of media as "lived environments," whereby users exercise imposed by the various environments are the student, television and radio, computer, knowledge, and receive communication in both the perception (1996, p. 199).

Online learning environment:

Unlike courseware and bulletin boards or computer, OCL applications are collaborative learning, the instructor to repurpose and adapt. They can be scheduled for specific discussion or extended time.

Generic network tools and environments failed and significance to learning. The goal of our systems failed and use of collaborative activities. In the 1990s efforts to support advanced and knowledge building seminars, tutors, and knowledge-building environments became more advanced and included the use of collaborative learning.
s into the and pro-

dered manner

formation

1 effective

line tech-

referred

tical roles:

ricular tasks

Educators

rowers for

nt-creation

ferred to as the

oring tools,,

ent.

ed at teach-

ement infor-

es and age

es are online

and/or video)


collaborative

versations,

port collab-

excellent

ey were not

r group dis-

icate

quiz tool, are

knowledge build-

the

of an online

OCL Theory • 99

whereby users exercise their powers of perception, mobility and agency within the constraints imposed by the various technologies and learning theories and pedagogies (p. 199). Online learning environments are not mere channels for transmitting information (such as broadcasting by television and radio, or lectures delivered by podcasting). They are environments where users can construct knowledge and negotiate meaning through conversation and collaboration, not just receive communication. They are experienced as lived spaces, to the extent that they facilitate both the perception of opportunities for acting as well as some means for acting (Allen & Otto, 1996, p. 199).

Online learning environments, just as their physical equivalents, are typically content-free. Unlike courseware applications, the content in OCL is discourse generated primarily by the learners. OCL applications typically use generic group-discussion software such as forums, bulletin boards or computer conferencing systems. Group-discussion software can be organized by the instructor into various forums and subforums, virtual spaces that can be designated by the instructor to represent different topics, different group activities, with different group sizes, scheduled for specified times during the online semester. Students navigate around the online course and select (click on) the appropriate forum to read and write comments or to work on individual or group assignments.

Online learning environments have the potential to support highly effective learning and knowledge-creation processes. Creating customized learning environments based on pedagogical models and frameworks remains a major challenge, although early steps have been taken in this direction. Tools embedded within the environment could provide relevant information, suggestions or scaffolds for particular learning processes. The need for tools and environments customized for online learning was first expressed in the late 1980s, for group-discussion forums that went beyond generic design to those intentionally designed to support collaborative learning and knowledge-building discourse. This did not mean generic online forums linked to quiz tools, nor sites preloaded with curricular content. The need was for online educational discourse environments customized and informed by pedagogical principles and learning theory.

Generic network tools—such as e-mail, computer conferencing and newsgroups—impose significant user overhead because they were not specifically designed to support educational activities. Instructors have had to expend great effort to reformulate their traditional classroom activities. Doing so with models or tools to shape the learning environment involved substantial administrative, organizational, and pedagogical challenges and cost. Many experiments failed and discouraged early enthusiasts. (Harasim, 1999, p. 44)

In the 1990s efforts to develop an online learning environment to support and encourage the use of collaborative learning online led to the creation of the Virtual-U web-based learning system.

The goal of our system, now known as the Virtual-U, was to provide a flexible framework to support advanced pedagogies based on active learning, collaboration, multiple perspectives, and knowledge building. This framework employs various instructional formats, including seminars, tutorials, group projects, and labs. (Harasim, 1999, p. 45)

The Virtual-U software employed a spatial metaphor in its interface to represent different "spaces" or forums for hosting individual and group educational activities. Virtual-U was distinguished by a pedagogical vision and framework that guided the software design. That framework was explicit: to support collaborative learning and knowledge construction. This was done
by designing a seamless online environment with embedded teacher and learner tools that could generate discourse spaces that could be configured and customized in a variety of ways, for individuals or groups using various communication features (asynchronous group conferencing and synchronous chats). The asynchronous computer conferencing system, named VGroups, was designed to enable users to gain multiple perspectives on the discourse: users could organize the online message transcripts according to subject, thread, author, date or reader-set keyword. VGroups provided instructors and moderators with tools to customize the discourse space by group size and user privileges (i.e., create, delete, read-only) to define discourse categories. The Virtual-U environment was based on geographical metaphors to help students and instructors navigate the virtual space: different spaces for each seminar, each discussion or work group, labs, cafe, personal workspace, course library, chat space, course-design tools, administrative tools, personal calendar and course gradebook. Messages could be text or multimedia and include web links. Virtual-U also prototyped educational scaffolds and templates to support instructors and learning in the use of such pedagogical techniques as debates, case-based learning and tools to measure different dimensions of learning processes. VUCat, the Virtual-U Course Analysis Tool, enabled monitoring of user participation (logins, number of messages read, messages written, replies) and generated graphical displays of summary data. Such data could be accessed by the teacher/moderator or by participants (depending on how user privileges were set up by the moderator). Templates for transcript analysis by categorizing the messages according to the three phases of OCL discourse were also developed for researchers, instructors and students. Students reported that such OCL templates were valuable for moderating online seminars and in orienting their own participation in online discussions: VUCat helped moderators view the volume and nature of messages, analyze the phase of discourse and thus help them to facilitate and advance the learning. Virtual-U exemplifies one approach to customizing an online environment to support collaboration and knowledge-building discourse.

Other important innovations in online learning and knowledge building were also developed and implemented in the 1990s. Knowledge Forum (KF) was designed as a knowledge-building environment, defined as: "Any environment (virtual or otherwise) that enhances collaborative efforts to create and continually improve ideas" (Scardamalia, 2003, p. 269). This definition can refer to educational as well as work or other organizational environments and includes essential characteristics or requirements for a knowledge-building environment, such as: support for collaborative creation and revision of conceptual artifacts; shared, user-configured design spaces with supports for citing and referencing one another’s work; systems of feedback to enhance self- and group monitoring or ongoing processes. Bereiter and Scardamalia (2006) note that “a knowledge building software environment does not merely promote Knowledge Age soft skills but embodies the essential characteristics of creative knowledge work” (p. 709). Moreover, as noted earlier, Scardamalia and Bereiter (2006) distinguish knowledge building from didacticism and constructivist learning: “traditional educational practice—with its emphasis on knowledge transmission—as well as the newer constructivist methods both appear to be limited in scope if not entirely missing the point” (p. 98). KF is an asynchronous web-based technology that provides a shared discourse environment. It emphasizes collaborative knowledge-building strategies, textual and graphical representation of ideas, and reorganization of knowledge artifacts.

KF intends to be used as an online learning system or an in-class technology. For each course there is a database. The main feature is called a note. Users have access to the following options:

- search for existing notes;
- write a new note;
- co-author, when more users share the authorship for the same note;
- reference and cite other notes;
- annotate an existing note;
- reply (build on others);
- create “rise-above” move.

The main technique is a set of scaffolds (a set of tools—and how to use them) to help users improve their understanding of the organized and linked ideas. This is true for online environment:

- “my theory”
- “I need to understand”
- “new information”
- “this theory can’t be right”
- “a better theory”
- “putting our knowledge into practice”

A learner or participant categorizes and organizes the content, builds a theory. According to Bereiter and Scardamalia, an environment would provide tools to make them feel a sense of control over the view or theory construction. Some online environment authors of such tools, offered on the course sequence, hierarchy and constructing the knowledge.

Other web tools and features delivered online and/or with video encourage one-to-one communication. Online tools such as search engines can course and knowledge enhancement their ability to discourse space.

What is key to the tools—and how to Marshali McLuhan? This is true for online designed with the instructors.

As a final note particular software technology is designed and developed.
tools that could in ways, for others, and instructors would organize the user-set keyword. Course space by categories. The instructors and instructors worked group, labs, administrative tools, and include web pages. Instructors and instructors set and tools to use. Analysis Tool, messages written, were accessed by the users. were set up by groups according to the instructors and students. One seminars and learners view them to facilitate an online environment. We also developed knowledge-building spaces collaborative definition can includes essential components: support for colored design spaces (back to enhance (2006) note that “a Knowledge Age soft skills (2009). Moreover, as from didacticism on knowledge limited in scope if technology that produced building strategies, physical artifacts. For each course following options:

- reference and quote an existing note;
- annotate an existing note without creating a new one;
- reply (build on) to a specific note;
- create “rise-above” notes, which subsume sets of related notes.

The main technique that KF employs is scaffolding (Scardamalia, 2004). Learners use a specific set of scaffolds (a set of six note types) that support cognitive operations intended to help learners improve their understanding. The basic scaffolds are notes that are labeled, categorized, organized and linked as one of the following options or note types:

- “my theory”
- “I need to understand”
- “new information”
- “this theory cannot explain”
- “a better theory”
- “putting our knowledge together.”

A learner or participant writes a note and labels it according to one of these six options to categorize the content, before sending it to the group database. The categories can also be customized. According to Bereiter and Scardamalia (2003): “a comprehensive knowledge building environment would provide a means of initiating students into a knowledge-creating culture—to make them feel a part of humankind’s long-term effort to understand their world and gain some control over their destiny” (p. 18). Key to the choice of learning environment and tools is the view or theory of learning that is supported by the technology. Virtual-U, KF and similar online environments were developed to facilitate collaborative knowledge building. Courseware authoring tools, on the other hand, are based on knowledge-transmission models, and are centered on the course designer who prescribes the content to be delivered and determines the sequence, hierarchy and quantity of the presentation. The learner does not engage in co-constructing the knowledge, but is charged with accessing and repeating the content correctly.

Other web tools based on knowledge-transmission models are broadcasting tools such as lectures delivered online using audio podcasts, long text messages or PowerPoint slides with audio and/or with video clips. Live communication tools such as video feeds are another tool that encourages one-to-many instructor broadcasting rather than many-to-many collaboration and communication.

Online tools such as presentation tools, document tools, productivity tools, web browsers and search engines can be used in concert with shared discourse spaces, to enhance and expand discourse and knowledge building. Such tools can be used by students to generate content and to enhance their ability to engage in learning and constructing knowledge together. But a shared discourse space remains key to OCL.

What is key to these environments is the existence of a shared space—not just an assemblage of tools—and how the shared space is designed and structured. A famous quotation attributed to Marshall McLuhan is relevant here: “First we shape our tools, and then our tools shape us.” This is true for online as well as physical environments, and it is essential that the technologies be designed with the intent to facilitate shared space and knowledge community processes.

As a final note to this section, it is critical to clearly understand the purpose for which a particular software tool was designed and to use the software systems and tools appropriately. A technology is designed for a particular purpose, and in such a way as to facilitate that purpose. Designing and customizing new educational environments and tools is a high priority.
There are few environments that have been especially customized for educational discourse available today. The rise of the open-source software movement holds promise for collaborative, global construction of new and customizable OCL environments, but the potential has yet to be realized.

In this next section, we explore the attributes of OCL environments, from the perspective of potential benefits and limitations of online forums in supporting collaboration and knowledge-building discourse. What is key, in addition to the access of the learner to educational offerings, is the nature and quality of the intellectual and social discourse that can be supported online. The next section discusses the attributes OCL environments for facilitating knowledge-building discourse.

**Attributes of Online Collaborative Learning Environments**

The environments in which we live, learn, work and socialize are all characterized by attributes that enable certain kinds of activities and communications, and limit or negate others. Face-to-face environments have particular attributes and affordances while online environments have others. OCL environments, specifically discussion forums, are characterized by discourse with the following five attributes:

1. Place-independent discourse;
2. Time-independent (as well as synchronous) discourse;
3. Many-to-many discourse (as well as one-to-many and one-to-one communication);
4. Text-based (with multimedia) discourse;
5. Internet-mediated discourse.

OCL environments benefit discourse in certain unique ways, but limits it in others. OCL environments introduce new opportunities for learning. Below is a brief discussion of some of the ways in which the attributes can affect OCL discourse.

**Figure 6.5** Types of Online Discourse (Screenshot of University of Phoenix).

1. **PLACE-INDEPENDENT DISCOURSE**

   Among the most striking benefits of the Internet for education is the ability to support shifts in teaching and learning to accommodate diverse needs and a variety of student backgrounds. Perhaps the greatest impact of the Internet on education has been the opportunity it offers learning and teaching in a number of ways. For instance, students can access the expertise of others in remote areas who are not able to travel for work, family or other reasons to a physical campus.

2. **TIME-INDEPENDENT DISCOURSE**

   A second attribute of OCL environments for building discourse is the nature of the interaction. The Internet offers learning and teaching in a number of ways. For instance, students can access the expertise of others in remote areas who are not able to travel for work, family or other reasons to a physical campus.
Among the most obvious and powerful attributes of the Internet is place-independent discourse. The ability to communicate and collaborate beyond the classroom walls has introduced profound shifts in teaching and learning.

Perhaps the primary implication of place-independent discourse is access, a critical goal of school, college, workplace and corporate education. Online education has a global reach and this offers learning a tremendous advantage. Place independence enables educational access for learners in remote areas, in parts of the world without access to particular disciplines of study, particular expertise or appropriate levels of study. It enables educational access to learners who may have to travel for work, and thus can participate in online education while on the road or who have family or other responsibilities or have physical disabilities that preclude travel to a place-based campus.

Place-independent discourse also has significant implications for the quality of learning and knowledge building. It enables greatly expanded student participation, and hence the quality and nature of the ideas generated and debated are potentially enriched. Discourse in OCL environments benefits from access to new cultures, perspectives and input: multiple perspectives are encouraged given the inclusion of participants from diverse locations and backgrounds. Place-independent discourse also enables the inclusion of guest experts or participants from outside the class, to enhance the discussions.

Place-independent discourse also introduces new challenges. In the case of global or cross-cultural discussions, there is a need for participants to become sensitized to cultural differences and nuances (some cultures may be more loquacious, while others value more formal interactions). Students participating in online classes may also face difficulties in creating suitable learning spaces at home or in their office (a parent in an online course may be challenged for computer access or by distractions if the computer is on the kitchen table).

A second attribute of online learning is time independence or asynchronicity. OCL is typically asynchronous, although synchronous (real-time) course delivery and group interaction is available through videoconferencing and audioconferencing technologies such as Skype.

Asynchronous access means that the online class is available 24 hours a day, seven days a week: 24/7. Time-independent discourse introduces a number of benefits for learning and knowledge building. Students do in fact engage in online learning activities 24/7, to read and write messages at all hours of the day and night. Participation in the online conversations is ongoing. And the expanded access enables online discussions to be highly active and interactive. There is no limit to
airtime and students can always make input. Feedback on ideas posted online can be relatively immediate and discussion and debate can refine and advance an idea over time. Or students can take more time if needed to draft a thoughtful response and access resources to inform and enhance their input. Students can also take advantage of spell checkers or grammar guides, to write and edit a comment. Asynchronous discourse also offers participants time to reflect on an idea or message, and to take as long as necessary to formulate a response. Learners can participate at their best learning-readiness times, especially important if they have family or other obligations that are time sensitive. They can participate at a time most convenient to them and appropriate to the course activity. Asynchronous communication also facilitates discourse across time zones.

On the other hand, students in online discourse activities such as seminars may experience communication anxiety while awaiting a response to their comment, or frustration if the discussions begin to lag. Long periods of time between messages can distract from or diminish the significance of input and undermine the communication flow.

3. GROUP (MANY-MANY) DISCOURSE

The ability to engage in group, or many-to-many, discourse is the basis for collaboration and knowledge building. As has been discussed throughout this chapter, group input enables multiple perspectives to enrich consideration of an idea or topic. Online forums or conferencing systems were developed to enable group conversations, and hence allow all participants to input their own ideas and thereby create a diversity of ideas, reactions and feedback on the discussion topic. Forums have proven to be excellent environments for communicating divergent input, such as verbalization and brainstorming. Online forums support creativity by enabling participants to draw on ideas from many perspectives and diverse sources; the ability to respond to and interact with a range of ideas allows us to refine and improve understanding and knowledge.

Current online forum systems, however, are not well designed to facilitate convergent thinking and this requires the instructor or moderator to organize and structure the group discussions into intellectual processes that lead to intellectual convergence and conclusions. Online discourse requires moderating and facilitating frameworks and techniques to organize the diverse and potentially voluminous input and to encourage intellectual progress. Online forum software also enables one-to-many communication such as broadcasts or lectures, and one-to-one communication as needed or appropriate.
OCL discourse is primarily text-based, although multimedia tools such as audio, video, animation and even avatars may be incorporated into online course activities and discourse. While some educators may question the use of text as the primary medium of communication in online learning (in preference to audio, video or animation), text is the groundbreaking mode of academic, scientific and intellectual discourse. The most important type of conversation in knowledge building is text or writing. As Bruffee (1999) notes, scientists are "compulsive and almost manic writers." ... Conversation among scientists illustrates, further, how we construct knowledge in every field and walks of life" (p. 53). Vygotsky (1962) posited the importance of writing to the process of knowing. The articulation of thoughts into written speech involves analytical deliberation: "The change from maximally compact inner speech to maximally detailed written speech requires what may be called deliberate semantics—deliberate structuring of the web of meaning" (pp. 99-100). Discourse and writing are powerful articulations and representations of our thoughts. It is how we express and communicate our thoughts, to others and ourselves. McGinley and Tierney (1989) emphasize the importance of writing in the construction of meaning and how we come to know, and cite this insightful statement by J. Gage (1986):

"Writing is thinking made tangible, thinking that can be examined because it is on the page and not in the head invisibly floating around. Writing is thinking that can be stopped and tinkered with. It is a way of holding thought still enough to examine its structure, its flaws. The road to clearer understanding of one's thoughts is travelled on paper. It is through an attempt to find words for ourselves in which to express related ideas that we often discover what we think." (Cited in McGinley & Tierney, 1989, p. 24)

Writing is thinking made visible, whereby it is subject to consideration and comment. Whether on the screen or on paper, writing is a way of discovering what we think and also a means to improve our ideas and discourse. Online discourse, moreover, is archived by the forum or computer conferencing software. This creates an accurate and verbatim transcript that learners and educators can access for replying to comments, reviewing the discussion, making multiple passes through the transcript and for retrospective analysis or assessment.

Online text is a compelling attribute for peer discussion and debate. Given the transmission speeds required for sending and receiving text, online text is accessible around the globe. Moreover, the Net Gen prefer texting to talking by cellphone. This trend is growing among all sectors of the population, even in the United States: Americans sent 110 billion text messages in 2008, double the number sent in 2007. The nation's 270 million cellphone subscribers each sent an average of 407 text messages in 2008. "We are seeing a clear trend of huge increases in text messaging," writes Amanda Lenhart, senior research specialist at the Pew Internet and American Life Project.
"If teens are a leader for America, then we are moving to a text-based communication system. For them, there is less interest in talking." Lenhart's research found that the average American teen sent over 2000 text messages per month, and that two-thirds of all teens use text messaging. ("Texting over Talking," Globe and Mail, December 21, 2009)

The popularity and expertise with text-based communication may bode well for online educational discussion forums. Until recently, text was widely (and unwisely) derided as too narrow in bandwidth to support student interest in learning online. The rise of texting by the Net Gen may turn attention to how, and not whether, to use this powerful discourse medium for best educational practice.

At the same time, online learning activities are incorporating more multimedia, such as the introduction of sophisticated simulations and immersive environments (see Chapter 7 for examples).

5. INTERNET-MEDIATED DISCOURSE

This final attribute is perhaps the most potent, given the range and scope of information, the vast repository of tools and resources, and the astounding number of people participating on the Web that are all accessible to online educational discussion forums. And the capacity of the Web, already unparalleled, is growing. The rise of the Internet and the scope of future plans and projections are beyond anything human society has experienced to date, and education will certainly be influenced.

Today, we have easy access at our fingertips to a global knowledge network whereby we can learn from all kinds of people and resources. Internet-mediated discourse already provides access to an astonishing myriad of resources that can be linked/hypertexted into our messages, blogs or discussions to provide new perspectives, information or evidence. The Web is an incredible repository of information and expertise that is easily accessed and yet offers immense rewards. We may intentionally seek specific data or resources, or serendipitously discover new insights and ideas or expand/refine existing ones.

Text, graphics and videos are easily incorporated into our discourse to enrich or illuminate our position. And the rate of technological change and increased computing power is astounding.

Within a few decades computers have gone from storing 1 byte (equal to one character), to a kilobyte (1,000 bytes), to a megabyte (1,094 kilobytes), then gigabyte (1,000 megabytes). Today, gigabyte is a common term in referring to the storage space on our computers and storage in a terabyte (1,000 gigabytes) is becoming mainstream. Major advances in storage capacity are evolving rapidly.

New web tools are emerging at a tremendous rate to create qualitatively new dimensions of discourse, collaboration and knowledge construction. Cloud computing refers to new ways of storage, that dramatically expand computing power. Cloud applications such as enormous repositories of information, collaboration and knowledge construction and understanding.

The vision of the Wide Web, as the new platform or domain that contains boundless information and documents, but that data can be extrapolated to us, to yield even more...

Data analysis and visualization are common and rich, and remain underdeveloped as qualitative analysis (or qualitative and data mining design) practice. However, new visualization tools are appearing. Visualization tools are appealing. Visualization tools are appealing for education and techniques to...

A final thought can be ventured access to knowledge, content and collaboration in an open manner. As a result, we can redesign and real content and context such as open access, reuse, and redistribution of open content i...
The vision of the Semantic Web was conceived by Tim Berners-Lee, the inventor of the World Wide Web, as the next step in web evolution. Berners-Lee has called the Semantic Web as “a web of data that can be processed directly and indirectly by machines” (1999, p. 177). By this, Berners-Lee means that whereas the current Web can only search and retrieve information that a user requests, the Semantic Web would be able to identify and display the most relevant information in a given circumstance. Data as well as documents would be on the Web and accessed by the Semantic Web technologies to process, transform, assemble and possibly even act on the data as needed. Data itself will become part of the Web and be able to be processed independently of application, platform or domain. This is in contrast to the World Wide Web as we know it today, which contains boundless information in the form of documents. We can use computers to search for these documents, but they still have to be read and interpreted by humans before any useful information can be extrapolated. The Semantic Web will be able to do the reading and interpretation for us, to yield even more profound analyses.

Data analysis and visualization tools are becoming major applications and potentially very valuable for educational research and assessment. Today, online quantitative data-analysis tools are common and more advanced ones are in the pipeline. However, qualitative data analysis remains underdeveloped, with few online tools to provide even simple and illuminative transcript analysis (or qualitative data) analysis. Analytical tools like Latent Semantic Analysis, text mining and data mining demonstrate some potential but remain complex and unwieldy for educational practice. However, major advances are under way.

Visualization software shows immediate promise. Visualization is a technique to graphically represent data. A simple example is the use of classic business charting software to visualize data using line charts, histograms or pie charts. Even such simple visuals can contribute to better understanding and have value in analyzing usage data or transcript discourse data in online education. Visualization software that is simple to use and which can reflect change over time (akin to line charts) is of particular value for studying educational discourse—to educators, learners and researchers. Histograms and pie charts help visualize content or categories. Many new visualization tools are appearing free, as open-source software, or as commercial products, representing an opportunity for educators, researchers and educational technologists to use or create such tools and techniques to study OCL processes in online discussions.

A final thought on the potential of Internet-mediated discussion is that in addition to unprecedented access to people and resources, the rise of the open knowledge and open content movement has enabled access to a wealth of academic and scholarly content that has been created but not traditionally made public, for free. Open Knowledge is a term used to denote a set of principles and methodologies related to the production and distribution of knowledge goods in an open manner. As set out in the Open Knowledge Definition, knowledge is open if “one is free to use, reuse, and redistribute it without legal, social or technological restriction.” Open knowledge and open content have led to the creation of, or access to, large repositories of data, information and content such as educational course manuals, curricula and lesson plans. Major open-content repositories and directories include:

- OpenCourseWare Consortium: portal linking to free and openly licensed course materials from hundreds of universities worldwide;
- MIT OpenCourseWare: free and openly licensed course materials from more than 1,800 MIT courses;
- Connexions: global open-content repository started by Rice University;
• OER Commons: OpenEducationResource Commons is a network of open teaching and learning materials, with ratings and reviews;
• Google Directory: open Content;
• OpenLearn: free and open educational resources from the Open University;
• Comprehensive Knowledge Archive Network (CKAN): directory/registry of open data/content packages and projects;
• UNESCO Open Training Platform: network for international development issues;
• Open ICEcat catalog: worldwide open catalog for product information.

The next three chapters will focus on OCL in practice. Discourse on the Web, organized in online courses and within knowledge communities and other associations introduces unprecedented opportunities for a paradigmatic shift in how we teach and learn, as will be discussed in Chapters 7, 8 and 9.

Summary
Chapter 6 introduced online collaborative learning as a theory and as a framework for pedagogical and technological design. The chapter discussed the context of the 21st-century Knowledge Age and why a new theory of online learning is necessary.

The history of online learning was introduced to provide a timeline and a view of the development of online collaborative learning over the past four decades.

An exploration of the definitions of OCL theory and pedagogy was provided to enable readers to distinguish among the various models that may be implicit in the concept of "online education," and the need to clarify the theoretical foundations embedded in the use of the related terms.

Effective online learning tools and environments were also discussed, with some illustrations from the field to demonstrate new directions in OCL technologies.

The attributes of OCL environments were identified and discussed to provide a context for understanding online discourse and its potential for collaborative learning and knowledge building.

Chapter 7 provides examples of OCL pedagogies in practice: the use of online simulations for group case studies, student-led online seminars, co-production of real-world products by online teams and immersive role-playing learning environments.

Chapter 7 illuminates:

• Introduces four case studies that illustrate how differing approaches to collaborative learning and how the students work together and how the instructor can facilitate the learning experience.
  a. Scenario One: Students and Instructor moderation in a game environment
  b. Scenario Two: Online seminar participants and instructor
  c. Scenario Three: Online team decision making and game play
  d. Scenario Four: Online simulation and decision making

Introduction
Chapter 7 offers readers a chance to see how differing approaches to collaborative learning can change. Four scenarios provide examples of different approaches to online education.

The use of scenarios...