An impressive collection of studies has shown that participation in well-functioning cooperative groups leads students to feel more positive about themselves, about each other, and about the subject they’re studying. Students also learn more effectively on a variety of measures when they can learn with each other instead of against each other or apart from each other.

Alfie Kohn, Punished by Rewards

In this chapter, we delve into the most commonly used form of social aggregation in campus-based, workplace, and distance-based forms of education. The group has a history that began with our primal ancestors as the most practical aggregation of individuals for survival and necessary social cooperation (Caporael, 1997; Ridley, 2010; E. O. Wilson, 2012). It has survived and flourishes today as, among many other things, the standard social form used in face-to-face classes, as the cohort and hierarchical organizational form that commonly characterizes education. The vast majority of research into social learning in formal education has focused on the group form because that has, until recently, been the only social option available to most face-to-face and distance institutional learners. In this chapter we examine the strengths and weaknesses of groups, and the typical evolution of educational groups as they form, perform, and dissolve. We also look at research on the development and support of social, teaching, and cognitive presence that defines quality online learning groups.

DEFINING THE GROUP

Webster’s online dictionary defines a group as “(a) a number of individuals assembled together or having some unifying relationship; (b) an assemblage of objects
regarded as a unit” (“Group,” n.d.). These definitions alert us to the most important characteristic of groups, whether online or face-to-face. First, groups are gathered together and exist for some purpose. Second, group members regard themselves and are regarded by others as having some unifying purpose. However, the dictionary definition allows for a wide variety of interpretations and connotations, and does not capture its distinctiveness in formal learning. We need something more precise. With that in mind, we note the following characteristics of groups used in formal and non-formal learning.

Hierarchical Structure and Leadership in Groups
In order to define the purpose and activities that are central to the definition and function of a group, members develop organization and leadership roles. In education, this function is normally assigned to the teacher, who often articulates the structure of the group’s activities in the ubiquitous course syllabus. Many courses also create smaller group activities—one of the challenges of this is that individuals must determine their own sense of structure and leadership—though often teachers fill this void as well by pre-determining group membership and even leadership roles. The same applies as we work our way up the organizational hierarchy: teachers report to department heads, principals, deans, vice-chancellors, presidents, and so on up the chain, often ending at regional or national government levels.

Groups Have Rules
The fact that teachers assign and structure groups reveals perhaps their most significant feature: they are designed. Groups exist largely as a set of implicit and/or explicit rules that govern their constitution, their activities, and expected behaviours of their members. These may be strongly stated as laws, regulations, or procedures, or be vaguer or less tangible expectations, norms and patterns associated with group membership. The rules can shift between formal and non-formal manifestations as the group persists through time. This further implies that many of the characteristics of groups are designed to foster or enhance a sense of identity, and this is often created at the cost of individual freedom.

Groups are Purposeful
Ridgeway (1983) argues that groups are formed for two possible reasons: support or task accomplishment. Primary groups are formed to provide support for their members, while task groups are formed to reach some goal or to accomplish a task.
In the process of working together to meet either or both of these needs, the group creates a set of norms or an evolving culture that strengthens the sense of group commitment.

**Groups are Technologically Driven**

Groups are more than labels applied to a particular collection of individuals. In many cases, groups are invented devices designed to orchestrate phenomena to a purpose: they are thus technologies (Arthur, 2009). They have forms, processes, and functions that are distinct and not emergent from the members and their interactions. Groups are deliberately bound together as an assembly of processes and structural forms to achieve some purpose or set of purposes. They utilize a range of processes that relate to group function and construction. Frequently, these processes are made explicit: technologies such as scheduling, formalized processes such as lectures, seminars, or guided discussions, regulations for behaviour, and so on are the engine of many groups in an academic setting. Implicit group norms, tacit process structures, and hierarchical process management also contribute the technological assembly that enables and channels group behaviours and activities. In the language of actor network theory, they are black-boxed (Latour, 2005), and translated into punctualized actors (Law, 1992). The technologizing of the group form is perhaps its most distinctive feature when compared to network and set social forms, neither of which incorporates such formal structures and processes.

**Groups Exist Independently of Members**

Groups celebrate the stability and comprehensibility of form and function. This is not to suggest that groups do not change as they develop over time—a field of study often referred to as “group development”—but that the process of development is constrained within the structures and norms established by the group’s founders and/or owners. In other words, groups exist as something distinct from their members. It is notable that some groups—companies, organizations, clubs, and societies, for example—have persisted for hundreds or even thousands of years with recognizable identities despite constantly shifting membership. While we might identify distinct cohorts and classes of students, the course they are enrolled in and its surrounding relationships with other technologies and structures remains a unitary object. The teacher, the location, the students, even the topics taught and means by which they are assessed may change over time, but a
course can seemingly persist through all of this, like the Ship of Theseus, or a river that remains the same, though everything in it constantly changes.

Members Aware of Membership
Members of a group invariably know that they are members. There may appear to be some very rare exceptions, such as a native tribe not knowing that its members are part of a country, or non-Mormons not realizing they have been included as honourary Mormons in genealogical records but, in all cases, such membership is, from the point of view of the member, that of the set (we will have more to say about this later). Most of the time we join groups intentionally, though in some cases other actions, such as being born in a particular country, the merger of two companies or departments, living in a particular city, or being enrolled in a course because we are working in a program, can make us members without our assent. Once we are members, we become obligated to behave as the group’s regulations require, or risk exclusion and possibly expulsion.

Groups are Exclusionary
Wilson, Ludwig-Hardman, Thornam, and Dunlap (2004) refer to groups that are formed in formal education contexts as “bounded communities.” They erect barriers that separate members from non-members. Shirky (2008) observes that groups are as dependent for their existence on who they exclude as much as who they include. Most groups involve rites of admission such as filling in forms, pledges, initiations, formal introductions, rituals, admission to buildings, et cetera. They typically place restrictions on who can and who cannot join. Interestingly, restrictions are commonly defined by set-based characteristics—race, creed, gender, academic qualifications, job, location, marital status, family, et cetera—sometimes supplemented with network characteristics: whether they are known to or recommended by an existing member, for instance. There are often rules that determine how, whether, and when people might leave a group. Many groups set time limits, especially in an educational setting, have rituals for exit such as award ceremonies, retirement events, or farewell parties, and may include processes for deliberate expulsion.

DISTINCTIVE EDUCATIONAL GROUP FEATURES

While there are many common features for all groups, whether intended as vehicles for learning or not, some features are distinctive in a teaching setting.
Participation Often Required to Obtain a Desired End
Group membership in an educational context carries with it a commitment to share time and knowledge with group members. How to assess this participation remains a contentious issue. Some teachers track attendance—reminiscent of the all-too-familiar daily ritual of elementary schools. Others use tools and rubrics to assess the quantity and quality of students’ contribution to online discussion forums. More innovative assessments include those where students produce learning artifacts, and assess themselves and their peers for attendance and participation.

Group Members do not Select Classmates or Instructor
Although larger institutions can offer greater choice for students, and students can and do enrol in courses with close friends, admission to a program and the assignment of teachers is a task jealously guarded by administrators. Despite the exclusion of student control at this level, students as stakeholders are being increasingly welcomed onto advisory and even governance committees in many institutions.

Group Members must Commit to a Fixed Length of Time
Course organization in batches, where cohorts proceed through a course of studies together, defines the vast majority of higher education learning systems. The groups that form using this organizational model provide a ready group of collaborators for social and cooperative forms of learning.

Group Members must make an Explicit Effort to Connect with Others
By coming together online or face-to-face, synchronously or asynchronously, group members enact the technology of the group. Groups do not meet unintentionally.

Groups Restrict Pace
If students are learning together as a group, there is nearly always some constraint on the speed at which they learn. Typically, they must attend the same lectures, or engage within a fixed period in a discussion forum, or submit assignments at the same time.

WHY GROUPS ARE WORTHWHILE
As a result of all these constraints, one might assume that groups are an unattractive form of learning organization, but this could hardly be further from the truth.
The vast majority of formal education takes place in group contexts. The group is a familiar and comfortable aggregation for both learners and teachers. The agricultural-based notions of pacing study to allow students freedom to work on the farm in the summer, and the flow of cohorts into evenly spaced and paced fall and spring terms has become synonymous with institutional learning, and is matched with promotions, catalogues, and advertising for even informal and non-credit forms of education.

The rationale for organizing formal learning in bounded communities is often defended, as the resulting security allows for the creation of a safe and supportive environment. Within this protected harbour, learners and teachers are free to explore ideas, make new friends, challenge one another’s interpretations, and place obligations of cooperation and support upon one another. From the earliest days of formal education, security for scholars and scholarship to evolve outside of the constraints of ideological or theological hegemony has been a dominant component of academic freedom, necessary for the development of innovative solutions to solve the complex problems facing society. Thus, there remains a strong case for the provision of group-based learning.

**COOPERATIVE FREEDOMS IN GROUPS**

In an educational context, grouped modes of learning share a number of distinctive characteristics, some are simply a result of physics, and others are the product of the nature of group social forms. While there are uses for groups in self-paced models of learning that we will refer to later, by far the most common model used in institutional and organizational learning is that of the paced group, which we will focus on here. We present a spider chart indicating the typical notional freedoms available to learners working at a distance in paced groups in Figure 4.1, noting that such groups in face-to-face learning are significantly more constrained.

**Place**

Although home situations or the need to visit cafés or libraries for Internet access may occasionally impose some limits on the freedom of where learning occurs, as in all distance learning, there is in principle virtually no limit on freedom of place in a group-based distance learning context.
Choosing or creating content has long been a defining role for teachers in group-based learning. Despite the large and growing quantities of learning resources available in cyberspace, many of which are freely accessible, students expect teachers to filter and annotate the content, so as to create a structured path through learning activities and content. It is interesting to note the widening gap between the learning that occurs in formal courses—where students are expected to consume content selected by teachers—and common behaviour in informal learning, where students turn to search engines, trusted friends, answer systems, or libraries when they want to learn something.

The fact that groups tend to work in lockstep makes control over pace relatively low in a group-based setting. Like time, it is a question of scale. In asynchronous mode, though a student may have to perform activities within a time period, he or she may vary the pace within those constraints. This is especially valuable when it comes to the much-lauded benefit of asynchronous discussion, because technologies provide students with time to reflect on contributions before posting them,
with pedagogically beneficial results. Even when the primary mode of teaching is synchronous, the primary mode of learning may not be. It is, for example, common for readings or activities to be set so that the learner can choose to address at any time between synchronous sessions. This illustrates the important point that, though a method can be described as a social constructivist mode of learning, it will nearly always include some elements that are behaviourist/cognitivist in nature.

At the smallest scale, the way that messages are phrased in a social-constructivist dialogue will usually take into account some model of learning, implicit or explicit. We may, for instance, phrase something as simply as possible, make connections, or draw analogies, all of which assume some model of how individual people think and learn.

Method
While a teacher may determine the general pedagogies used in a group-based learning environment, there are some opportunities for learners to negotiate the method. For example, if a student in a group has difficulties with a particular issue, the teacher or other learners can reformulate a discussion, provide a different presentation, or an alternative perspective that is pedagogically different from what was originally planned. As with other freedoms in group contexts, however, the freedom of an individual may be constrained by the needs of others in the group.

Relationship
If the teacher has decided that a particular form of interaction is required, there may be relatively little control afforded to the learners in a group as to how and with whom engagement occurs. Indeed, it is commonplace in formal learning for engagement to be assessed, whether directly or indirectly, placing strong constraints on how and whether learners engage with one another or their tutors.

Technology
Most Internet-based solutions allow some control over the devices and software used to access them. This can, however, lead to problems such as inequalities between learners, and support for a preferred technology may be limited or non-existent. Particularly commonplace examples of this include when a textbook is only provided in either paper or electronic form, or a particular web browser must be used, or mobile devices are not supported.
Medium

Group-based approaches seldom offer much choice over the media used for learning. Normally the institution or the individual teacher makes a decision about the type of media used both for disseminating content and supporting interaction within the group. This decision has become much more challenging for both teachers and students with the development of very low cost so-called Web 2.0 applications, providing hundreds of additional choices beyond the textbook and face-to-face interaction that have defined classroom groups or the Learning Management Systems (LMSs) supporting the vast majority of online learning groups. Technical and end-user based support for large numbers of web-based programs present a large and growing challenge for learning organizations that, while attempting to provide up-to-date alternatives, are constrained by the need to protect group confidentiality and security, and ensure performance.

Time

Choice of time for learning engagement depends on whether communication is synchronous or asynchronous. In most group-based classes, it is common for asynchronous tools like email and discussion forums to be used for interactions. These provide a certain amount of freedom of time for engagement, albeit usually with constraints. It is typical to require responses within a period of days, or sometimes, hours. Synchronous tools, of course, provide no freedom of time at all.

Delegation

The ability to ask for clarification, change the direction of discussion, seek help and so on, makes freedom of delegation in a group-based learning context quite high. Though the hierarchical nature of group-based approaches to learning means that teachers may play a very large role in determining how and when interactions and learning transactions occur, there are often plentiful opportunities for learners to ask for more guidance. There are some dependencies, however, on other learners. While a single individual may seek further guidance or a change in direction, the needs of one typically need to be balanced with the needs of the many. If people are learning together, then outliers who wish to take a different direction may not always be heard.

Disclosure

There is seldom a great deal of control over what and how things are disclosed in a traditional institutional group setting. It is nearly always determined by the
teacher, and represents one of the more technological aspects of groups: disclosure is designed into group interactions. A teacher may, for example, decide that sharing is bad for final assignments, but necessary for collaborative work. Commonly, the teacher may require students to engage in discussion forums or, less obviously controlling but equally coercive, may provide a discussion forum where every message is seen by all members of the group that is the only formal means of engagement for a course.

Transactional Distance and Control in Group Learning

Moore formulated his theory of transactional distance (1993) in an era when it was assumed that the teaching presence might be mediated through structured resources or more immediate communication between a student and his or her teacher via phone or letter. However, it provides a useful lens for exploring dynamics within groups. In a group, learners and peers may also participate as teaching presences, leading to a more complex dynamic of distance. It is certainly true in most learning based on social constructivist models that the communication distance between teacher and learner is much lower than it is in an instructivist setting. This puts the learner in a more powerful position when negotiating control, where he or she is able to challenge and change the path of learning.

However, this occurs in a group setting in the company of other learners, each likewise engaged in negotiation for control, and each who may become the teaching presence in a learning transaction. The communication and psychological distance is thus very low, thanks to the effects of distribution within the group. However, transactional control is affected by competition. For example, if a learner seeks clarification from a teacher, though this increases control for him or her, from the point of view of others in the group their control is diminished, at least until they contribute and take back the reins themselves.

Group Size

Different patterns and methods work differently in various sizes of groups. In most cases, this is not due to the nature of groups as a social form so much as it is to the constraints of physics. For example, a teaching method that involves each member of the group sharing what they have learned with the rest may be effective among five to ten learners, but would require more hours than there are in the day with a group of 200, and would lead to massive decreases in attention and engagement after the first few students had shared their findings.
The technological nature of groups means that pedagogies for them must be engineered with due consideration for the exigencies and constraints of the group context, including its size. In the example above, one might use a different pedagogy altogether, or if one were set on the pedagogy, one could split the larger group into smaller ones, pick some students to present to the rest, or use a pyramiding process so that small groups selected the best and presented these to larger groups. While most size limitations are amenable to common sense, there are some differences in various kinds of groups that are worth mentioning.

Dyads
The basic dyad consisting of two individuals is common in, for example, supervisor-supervisee relationships, such as Socratic dialogue, master-apprentice models of learning, and personal tutelage. This is, as we observed in Chapter 2, a highly effective but generally too costly method of learning. While a group of two may be the smallest social group form from a logical perspective, there is normally little to distinguish a group of two from a set or net of two: individuals will establish roles and rules according to their needs. An exception exists in the supervisory relationship, where there may be rules and procedures that govern the nature of the interaction.

Work/Family Groups
It is not uncommon for study groups, tutorial groups, and small breakout groups to contain around five members, corresponding to the archetypal work/family group identified by Caporael (1997). Such small groups make the coordination and allocation of tasks simple to perform, even in the absence of particularly strong roles. In an online setting, a small group often communicates with nothing more than email or teleconferencing, modes of communication that, in larger groups, become very unwieldy.

Demes
The typical class in a school, and in many adult learning classes, is the rough size of what Caporael (1997) called a deme (from the Greek demos, or “people”), like the hunter/gatherer bands of our distant ancestors, consisting of around 30 members. It is at least a plausible hypothesis that we have evolved through group-level selection such that the deme is a manageable size of group that can work face-to-face in a coordinated way, assuming some leadership role to organize its actions.
Tribes
Identified by Caporael (1997) as the “macrodeme,” some group forms drift toward the set in their constitution, typically when they approach or exceed around 150 members. As we have previously noted this is significant in an educational context because tribal groups such as universities, schools, and colleges have the features of closed membership, rules, roles, and hierarchies that are common to all groups but typically lack the close connections, time, and pace restrictions of things like classes, tutorial groups, and workgroups. In these cases, as well as in more time-constrained settings such as lectures given to large groups of students who do not know one another, it may be more useful to think of the group as being a set. Unlike a true set, a tribal group’s hierarchies and rules mean the form of learning that occurs is typically very much dominated by the teacher or other group leader. This is not the self-directed, topic-driven process that characterizes set-based learning: the teacher not only determines content and activities but also can act as arbiter and judge of what the set shares. This latter feature of tribal learning is particularly valuable, as the teacher can guide the learner down the desired learning path. Also, as suggested by our example, the teacher is able to manage the group processes so that larger tribes can be split into smaller groups, with all the benefits they bring.

LEARNING IN GROUPS

Since group learning has been such a dominant form in institutional and organizational education, there is plenty of literature on how groups work in that context. Groups are as much machines for social action as they are social binders, and they are replete with repeatable processes that enable their construction and maintenance. In the following sections we explore some of the features of this semi-mechanical nature.

Online Group Formation
As groups in education are temporally bound, with pacing and scheduling limited by constraints on time for their formation and dissolution, it is important to pay attention to the way they evolve over time. A large number of researchers have studied the way groups form and develop. Here we present some of the more well-founded models.
Dimensions of Change

Many kinds of group development show great similarity among cyclical, linear, and recurring models. J.D. Smith (2001) argue that groups develop in three dimensions. The first is the social dimension, and occurs most often at the early stages of group formation when members come to know one another and the roles they are playing in the task. The second dimension relates to task development, in which the task that the group sets for itself evolves over time as component parts are completed and new assignments are accepted. The third, as Smith notes, is the dimension of group culture that develops with norms, values, and standards of behaviour. Even when assessment is criteria-based, student perceptions can lead to a competitive rather than cooperative environment. This interplay between dimensions provides a useful way to understand the growth of groups.

Forming, Storming, Norming, Performing, and Adjourning

Perhaps the most commonly known and easily remembered model of group development is Tuckman and Jensen’s five-stage model of forming, storming, norming, performing, and adjourning (1977). This model adapts well to online learning groups.

**Forming.** The formation stage is often set by the educational institution and is quite normalized by the familiar roles that teachers (assertive and taking charge) and students (passive) easily fall into. Once a course has begun subgroups may form, but they are typically guided in their inception by the teacher.

**Storming.** The storming phase is also often constrained in formal education by the expectations and compliance of group members. Although aggressive and flaming behaviours in online groups have been widely studied (N. McCormick & McCormick, 1992; Schrage, 2003) formal education groups note the almost complete absence of such behaviour, and even an excess of what our colleague Walter Archer, cited in Garrison and Anderson (2003), refers to as “pathological politeness.” Fabro and Garrison (1998) reported that the cohort they studied was “generally conditioned in many ways to be polite” and disagreement was taken “as either a personal affront or they were open and a very few people were open” (p. 48). This group appeared to be “quite timid” and “polite” and “began to just agree with each other rather than challenge each other’s ideas” (Fabro & Garrison, 1998, p. 48). It should be noted however that
these observations were made on Canadian students, who may have distinct national problems with pathological politeness! Thus, for groups to form effectively in formal education, teachers might be advised to stimulate rather than repress “storming” behaviour; this might explain the popularity of online debates (Fox & MacKeough, 2003; Jeong, 2003).

**Norming.** Norming refers to the comfort level that members of groups develop with one another as they come to have both their social and task expectations confirmed in their interactions with others in group meetings. The group stage is now set for the production and accomplishment of tasks. In some cases, the norming stage may be formalized into rules, procedures, and perhaps even a social contract that specifies expectations (Kort, Reilly, & Williams, 2002).

**Performing.** Once the previous stages of group development have been accomplished, the group can get on with doing what it is supposed to do.

**Adjournment.** Finally the group prepares for adjournment, with such rituals as the end of class party, completion of course evaluation forms, and fretting and extensive questions related to final examinations and term paper requirements.

Despite the linear nature of Tuckman and Jensen’s model (1977), many researchers have noted that group development also proceeds cyclically, revisiting earlier stages, or even progresses swinging like a pendulum, with “storming, norming, and performing” being visited in succession as the group develops over time.

**Salmon’s Five-stage Model**
Most of the interest in and study of groups occurred during the last half of the twentieth century before online groups were common. Perhaps the most influential model of group development for online groups—and especially those within educational context—was developed by Gilly Salmon (2000). Her five-stage model has been particularly popular and successful in recent years as a means of developing learning communities. Emerging from her research into online communities, the model is both descriptive of successful learning communities and prescriptive as to how they evolve, particularly with regard to the role of the moderator in facilitating their development. The model works in Maslowian hierarchical style. The five stages are:
Access and motivation. At this stage, the moderator’s role is to ensure that learners are able to use the relevant technologies, are enrolled as group members, and feel welcomed on arrival.

Online socialization. Learners engage in non-threatening message sending, typically greeting others, saying something about themselves, and getting to know people in the group. Salmon suggests that the moderator should help students become familiar with the norms and behaviours expected, offering bridges between this and prior experience in online and offline communities.

Information exchange. Learners begin to share ideas and knowledge with one another. The moderator now acts as a facilitator, establishing tasks and sharing learning materials and processes.

Knowledge construction. Learners begin to engage in meaningful dialogue, exploring and challenging ideas. The moderator facilitates this process with probing questions, challenging ideas, summarizing, channelling, and modelling good practices.

Development. At this stage, not reached by all groups, learners take responsibility for their own learning, challenging not just ideas but the process itself, taking the learning beyond the moderator’s prescribed limits. When this occurs, the moderator becomes an almost equal participant, supporting the independence of learners and dealing with problems as they arise. The model seems to fit well with our experience of online groups up to this point. However, it is not entirely clear what is being developed at this stage. We would have expected to see “learning application” or at least “integration” with relevant and authentic aspects of the real world contained within this phase.

Salmon’s model has proved useful in many online learning communities, and appears to describe what tends to happen in a well-moderated learning community, offering good advice for those hoping to facilitate such a process. There are complexities, however. In many cases, a cohort of learners will have gone through this process before, and may not need to do so again. Author Dron instituted Salmon’s model across a distance-taught program, applying the pattern mindfully in every course, and found that the first two or three stages were of little or no further value once they had been addressed in the first course taken by a given
cohort (Dron, Seidel, & Litten, 2004). Students in a cohort were already familiar with the tools and one another, so they were able to start a new course at stage 3 or even 4 of the model. The intentionally scaffolded process thus got in the way of efficient learner-centred learning. As with any framework, the context of application needs to be taken into account and the framework modified to suit the needs, subject area, and learning history of the group concerned.

POWER AND TRUST RELATIONSHIPS IN GROUPS

Roberts (2006) notes the problems with power in groups that are referred to as “oppressed group behaviour.” Power relationships that define the organization often infuse thinking and constrain creativity within the group. The accountable nature of group interactions means that members act under the power constraints that define their lives, and these often exist outside the relationships within the group. This is especially relevant in the rigid hierarchy that differentiates teacher from student identity, power, and specific contributions in group contexts.

Trust is also problematic in groups. While group members need trust in order to freely elicit honest contributions from everyone, the unbalanced power dynamics noted above and the competition among students both limit its development. Formal education is marked by the assessment of student accomplishment. This has many downsides, not least of which is the enormously demotivating effects it has for both high and low achievers (Kohn, 1999), but is particularly pronounced when assessment is norm- rather than criteria-based, such that one excels based on their accomplishment and learning compared to other students, not from absolute knowledge of content or individual learning accomplishment. This was most dramatically evident during author Anderson’s first-year calculus class at a university where rather inept teaching, coupled with low motivation and a very large class resulted in a pass mark being calculated at 19%! This curve-graded score allowed all (teacher included) to feel good about their learning and themselves, even though most were failing to achieve the objectives of the class. It relates back to the problem of power relationships: competitive grading is less a way of enabling students to learn, and more a way of emphasizing and enacting the power of the teacher to control the process (Kohn, 1999). It is difficult to develop trust in competitive environments, thus explaining in part the distrust many teachers and students have for collaborative and cooperative learning models, despite the proven efficacy of these approaches (D. Johnson & Johnson, 1994).
In 1999 author Anderson with colleagues Randy Garrison and Walter Archer at the University of Alberta devised a conceptual model for online education, which they named the Community of Inquiry model. They developed it to provide both practical guidelines for teachers and designers, and as a research model for what was then asynchronous, text-based models of online education that were the norm for online education. During the last decade many other researchers have employed this model, and it is likely the most frequently cited tool used to evaluate formal distance education. Google Scholar (2013) lists over 1,000 citations for each of the four major papers and the book written by the original COI authors. The seminal articles associated with this model, as well as links to the work of numerous researchers referencing and extending it are available at (www.communitiesofinquiry.com).

Foundations

The COI model has its roots in Dewey’s (1933) pragmatic model of practical inquiry, in which ideas must be tested in the crucible of real application to establish and hone their accuracy. Lipman’s (1991) community of inquiry provided the model with both its name and the notions of reflective learning in a formal education, which he characterizes as follows:

- Education is the outcome of participation in a teacher-guided community of inquiry;
- Teachers stir students to think about the world when they reveal knowledge to be ambiguous, equivocal, and mysterious;
- Knowledge disciplines are overlapping and are therefore problematic;
- Teachers are ready to concede fallibility;
- Students are expected to be reflective and increasingly reasonable and judicious;
- The educational process is not information acquisition, but a grasp of relationships among disciplines (Lipman, 1991, pp. 18–19).

Note especially the essential role of the teacher in Lipman’s description, which fuelled the desire of Anderson, Rourke, Garrison, & Archer (2001) to explicate the role of the teacher and teaching presence created in formal education transactions. Lipman (1991) notes that within the community of inquiry members question one another, demand reasons for beliefs, and point out the consequences of one another’s ideas, thus creating a self-guiding and emergent community when
adequate levels of social, cognitive, and teacher presence are present. To round the process off, Garrison’s (1991) model of critical thinking was used to develop stages and processes of reflection and decision-making that define critical thinking.

These theoretical works were used to provide conceptual order and a practical heuristic model to assess the teaching and learning context in the online community of inquiry. The model consists of three elements deemed essential to successful educational transactions: cognitive presence, teaching presence, and social presence. Garrison, Anderson, and Archer developed tools and techniques to reliably measure each of these three presences in text-based, asynchronous computer conferencing transcripts. In this section we expand and apply the ideas from the COI model to online group-based learning in both synchronous and asynchronous modes.

Community of Inquiry and Cognitive Presence

Cognitive presence differentiates social interaction in a group-based community of inquiry from casual interaction in the pub or on the street. Some have argued critical thinking most clearly defines quality in higher education contexts (Candy, 2000). We thus built on models and ideals of critical thinking to create our notion of cognitive presence.

Despite almost universal adoption of the notions of the importance of critical thinking in higher education, it is quite difficult to gain a consensus from the literature or practice on what it actually means. The confusion is related to the fact that critical thinking is both a process and a product (Garrison, Anderson, & Archer, 2000). Teachers in group contexts are expected to develop learning activities, model the process of critical thinking, and assess the outcomes of cognitive presence in the products of study—projects, papers, and test results—designed to provide evidence of the successful completion of critical thinking. In the Community of Inquiry model, we focused on gathering evidence of the process of critical thinking, and postulated it could be found in the activities of teachers and learners, as demonstrated by their contributions to the threaded discussions that serve as the main communication tool for much online group-based learning.

The first of four phases of cognitive presence is some sort of triggering event. This is often provided as an opening, question, or invitation for comment by the teacher’s post to the group. But additional triggers arise when participants reflect upon or challenge one another. To be effective, triggering messages must be meaningful, must spring from the experience of the group, and must be accessible and within conceptual understanding of the group’s members. Poscente and Fahy
(2003) empirically defined triggering statements by the numbers of responding posts learners generated and, as expected, found that teacher triggers were most heavily responded to. However, student triggering statements were also observed on a regular basis in threaded online discussion.

The second phase of cognitive presence is “exploration,” within which group members iterate between individual reflection and group questioning, probing, and extension of their ideas and solutions to the triggering idea. This exploration is a divergent phase characterized by brainstorming, questioning, clarifications, and exchange of information.

During the third “integration phase” of the group-based development of cognition presence, focus shifts from exploring meaning to constructing it, and the integration of ideas into robust conceptual models. The leadership of the group is important at this stage, as group members often feel more comfortable “exploring” a problem until interest wanes without making the serious effort needed to arrive at a conceptually whole and integrated solution.

In the final “resolution phase,” the group focuses on ways to apply the knowledge generated in the three previous phases. This resolution may take the form of application and testing in a real-life context. However, often in educational applications, the resolution is a well-argued and detailed answer to a triggering problem.

Cognitive presence has been measured through surveys of participants’ qualitative interviews, automated neural network analysis of key words, and the transcript analysis method developed by the original COI team. In nearly all studies, evidence of the fourth and final resolution phase has been minimal, indicating that perhaps true resolution and critical thinking rarely occurs in the closed and often artificial groups or classes that define most forms of higher education.

Community of Inquiry and Social Presence
The second critical component of the Community of Inquiry is social presence, defined as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). This definition was later expanded to include a sense of other group members as well as self and common commitment to a task. We identified three broad categories of social presence indicators: affective, open communication, and cohesive communicative responses. Thus development of a group and individual sense of social comfort is evidenced by use of affective interactions such as humour, self-disclosure, and changes in media use such as employing bold text, or the
use of emoticons in group discussion. Open communication is shown by timely responses to member posts, quoting and referring to others, asking questions and complimenting or thanking other group members for their contributions. Finally, cohesive comments such as addressing group members by name, using inclusive pronouns to describe the group, and informal salutations indicate a sense of group cohesion and commitment that we defined as a component of social presence. Once again, through transcript analysis we were able to quantify the extent of social presence evidenced in the group, and this was correlated with satisfaction and perception of learning in a number of later studies.

Community of Inquiry and Teaching Presence
The final component of an effective group-based Community of Inquiry in formal education is Teaching Presence. Teaching presence begins with the instructional design and organization of tasks that are necessary to construct a context in which social and especially cognitive presence arises. In group activities within formal education contexts, both students and teachers have accumulated expectations about these organizational issues that often lead students to a role of passive reaction to the learning agenda specified by the teacher. The second component of teaching presence is the active facilitation of group discussion or other learning activities. Good teachers find opportunities to question, drill down and challenge learners to thoroughly explore, integrate, and apply the knowledge generated by the group. They also nurture the development of social presence by insuring appropriate levels of contribution by group members, and help establish a climate of trust and acceptance within the group. Finally, teaching presence includes direct instruction where the teacher or other group participants contribute their specialized knowledge to the group, diagnose misunderstandings, and otherwise provide leadership in the attainment of deep and meaningful learning experiences.

Applying the Lessons of the Community of Inquiry Model
The COI model has been widely used by both researchers and instructional designers. The designers validated and compared it to contexts beyond asynchronous online learning to show its relevance in comparison to face-to-face learning (Heckman & Annabi, 2005). Methodologically, the COI model was validated through student survey responses (Rourke & Anderson, 2002) and factor analysis of survey results (Arbaugh, 2007). Work has continued to develop a standardized instrument for measuring the extent of community of inquiry formation through student survey assessment (Swan et al., 2008).
We conclude this overview of COI's contribution to the design and function of group-based learning with the series of recommendations that Randy Garrison made for designers and teachers. He advises them to

- Establish a climate that will create a community of inquiry;
- Establish critical reflection and discourse that will support systematic inquiry;
- Sustain community through the expression of group cohesion;
- Encourage and support the progression of inquiry through to resolution;
- Foster the evolution of collaborative relationships where students are supported in assuming increasing responsibility for their learning;
- Ensure that there is resolution and metacognitive development.

As these recommendations demonstrate, the community of inquiry model has strong implications for process, and emphasizes the deeply technological nature of traditional groups in formal learning: this is about repeatable methods and techniques that carry with them assumptions of structure and architecture that are designed and enacted.

THE CRITICAL ROLE OF TASKS ON GROUPS

Collaborative behaviour is not a function of the group, but of the learning activities assigned or undertaken by that group. The task sets the context, the goals, and in most cases the appropriate organizational structure for the group. Townsend, DeMarie, and Hendrickson define virtual teams as “groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task” (1998, p. 18). The role of the task is highlighted as having major significance in the function, organization, and success of virtual and face-bound groups. Bell and Kozolowski (2002) observe that task complexity is an especially salient factor. However it is not only the task but also its treatment by the group that affects its complexity. Tasks used by educators with learners vary widely in a number of ways.

Van de Ven, Delbecq, & Koenig (1976) described four types of organizational structure of increasing complexity that a group may develop to accomplish a task. The first was termed polled or additive: group members simply combined their work to accomplish the task. The second requires group members to work on some part of the task before moving the incomplete work to another (often
differentially specialized group member) for additional work. The third follows a less structured back-and-forth movement of task artifacts, with group members adding value at various times as the product moves through production stages to completion. The final and most complex structure was termed “intensive,” and is characterized by continuous discussion, debate, evaluation, and contribution among team members at all stages of task function.

Virtual groups, because of the reduction in proximal clues, tend to need greater and more explicit amounts of external direction (teaching presence), and more structured forms of organization. They also tend to both rely upon and nurture more self-direction among learners than teacher-dominated groups characteristic of campus education. Learners have many more responsibilities than merely arriving at the designated teaching location at the correct time each week. These include technical competencies so that they can effectively utilize the various communication and information technologies necessary to complete of group tasks. They also must be able to monitor and effectively manage their time—being focused and committed enough to attend to assigned group tasks, while at the same time able to resist time-wasting activities such as unfocused web browsing.

Trust, Cohesion, and Groupthink

Groups or “teams” (as they are often referred to in business contexts), have long been the focus of study by business sociologists. Groups function as the primary means to increase trust, alignment, cohesion, and ultimately efficiency in the workplace (Burt, 2009). Group members, through exposure to one another and common social norms and behaviours, come to share common ideas, create localized jargon, and develop and share “similar views of proper opinion and practice and similar views of how to go forward into the future” (Burt, 2009, p. 4). This commonality leads to integration, the development of trust within the group, and the expectation of support and help when needed from individual group members. Further, increased communications within a tightly defined group creates efficiencies, and perhaps just as important, an inhibiting relational cost for bad behaviour. All of this is positive and is used by effective group-based teachers and campus administrators in education to foster bonding and integration within classrooms, which in turn leads to increased engagement and academic success (Kuh, 2001).
However, cohesion in groups, like most social variables, has both positive and negative consequences. The American sociologist Irving Janis is credited with coining the term “groupthink,” which he defined as “a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members’ strivings for unanimity override their motivation to realistically appraise alternative courses of action” (1972, p. 9). Groupthink is a popular concept intuitively understood (at least in part) by academics from many disciplines and the general public. However, the antecedent conditions necessary for the emergence and symptoms of groupthink have not always been substantiated by rigorous experimental study (see, for example, Turner & Pratkanis, 1998). Nonetheless, some recent scholars have argued that the groupthink phenomenon is even more ubiquitous than Janis thought, and arises even in the absence of many of his critical antecedents.

Janis identified two groups of antecedent conditions leading to groupthink. The first are of a structural nature:

- Insulation of the group: Insulation is a cherished characteristic found behind the closed classroom door, gated campus, and password-protected discussions common in educational groups. Though originally designed as a way to protect dissenting scholarly views, the closed group now serves as much to isolate as it does to protect group members. As S. E. Page observes, this can lead to a lack of diversity, as well as reduced creativity and problem-solving capacity (2008).

- Lack of a tradition of impartial leadership: Educational contexts have a strong tradition of leadership exerted by the teacher and school administrators. While we do not suggest that this leadership inevitably lacks impartiality, the leadership is often authoritarian, and at best carries a bias toward scholarship and at worst one that favours conformity.

- Lack of norms requiring methodological procedures: School groups seldom lack methodological procedures for getting things done, but again these procedures are rarely critically examined by either students or teachers.

- Homogeneity of members’ social background and ideology: Despite the desire of many advocates of liberal democracy for schools to serve as a great equalizer, there is considerable evidence that schools and the groups within them are one of the main conduits for the transmission of dominant social values with accompanying class divisions and capital moving only between generations of the privileged.
Janis’s second set of antecedents of negative groupthink is associated with emergent social conditions that are characterized by

- High stress from external threats: The life of a student is often a very stressful one. Examinations are frequent, and the recent trend to require more group and collaborative work adds additional stress to many students forced to be dependent upon others and deal with exploitation by freeloaders and social loafers (Piezon & Ferree, 2008).

- Recent failures: The external threat imposed by numerous tests and examinations of course also gives rise (at least occasionally) to failures by both groups and individuals.

- Excessive difficulties on the decision-making task: When groups move online, there is evidence that group decision-making, though not impossible, is slower and usually less efficient (Walther, 1994); online groups “are more prone toward conflict, and, most importantly, have more difficulty achieving consensus” (Farnham, Chesley, McGhee, Kawal, & Landau, 2000, p. 299).

- Moral dilemmas: Formal education rarely struggles with ethical dilemmas, except through removed academic lenses. Nonetheless, educational groups have their own set of issues related to plagiarism, cheating, and other forms of ethical dilemmas (Demiray & Sharma, 2009).

From the above description of antecedents, one can see that there is high potential for groupthink and its associated negative outcomes in group-based models of formal education. Indeed, one could wonder—given the prevalence of these antecedents in formal education groups—if anything but impaired forms of groupthink ever arise. Confronting the lack of direct causal relationship between antecedents and groupthink outcomes, and the knowledge that groupthink impairments exist to some degree in almost all groups, Baron (2005) developed a ubiquity model of groupthink in which he identified three broader antecedents: shared social identity; salient norms; and low group self-efficacy.

Our own most vivid experience of groupthink in online groups was evident in the “pathological politeness” exhibited by many students in our online discussion groups (Garrison & Anderson, 2003). The literature from the earliest days of the Internet has documented examples of “flaming” and other disruptive behaviour (Lee, 2005; Sproull & Kiesler, 1986). However, in our classes and the transcripts of others we examined, we found just the opposite—many instances
in which learners refused to engage in healthy debate or challenge one another’s ideas or assertions. This excessive politeness is likely an indicator that groupthink is lurking, ready to muzzle ideas that potentially strain group cohesion or challenge established authority and ideas—not an atmosphere we were hoping to develop in our graduate courses.

This brief overview of the extensive literature on groupthink underscores the potential negative consequences of facilitating education in group contexts. These are to some degree balanced by the pedagogical value associated with collaboration and productive learning in a community of inquiry. Nonetheless, groupthink lurks, ready to emerge in any group context, and both learners and teachers are advised to guard against the social forces that attract us to familiar solutions that produce less stress and conflict among group members.

SOCIAL CAPITAL IN GROUPS

These group connections often persist beyond the course of studies and are a prime mechanism by which the “hidden curriculum” is propagated. The hidden curriculum is often associated with classism and dissemination of dominant ideologies (Margolis, 2001). It is worth repeating that, in education contexts, especially those operating at a distance, cohesive groups also are the primary mechanism for more positive applications of the “hidden curriculum,” including help in “learning to play the game” and learn how to learn in often unfamiliar mediated contexts (T. Anderson, 2001).

THE TOOLS OF GROUPS

A variety of tools has been developed to support groups of learners, the most ubiquitous of which are learning management systems (LMSs), or as they are referred in the UK and some other places, Virtual or Managed Learning Environments (VLEs or MLEs).

Learning Management Systems

Learning management systems were developed to make online course creation and management possible for teachers with minimal Internet expertise. They offer a suite of tools matched to the needs and current classroom practice for average educators and trainers working with adults or high school-level students. Prior to the development of LMS, web course authorship was accessible only to those with
considerable Internet and page creation skills, supplemented with unintegrated discussion tools such as newsgroups and email. Many early examples of web-based courses consisted of pages of text, with a few of the presentation, assessment, record-keeping or monitoring tools developed over the years for campus-based instruction. Thus, the arrival of effective and relatively easy-to-use LMSs proved instrumental for the rapid adoption of web technologies both in campus instruction as blended learning and for distance education applications.

A central binding feature of almost all LMSs and related systems is that of roles: there is nearly always at least a teacher role, with the power to control the environment to a far greater extent than a student role. In many systems, roles may be assigned for different features and aspects, and complex organizational forms may be embedded, with different roles for tutors, course coordinators, course designers, systems administrators, teaching assistants, evaluators, and of course, students. This deep structural embedding not only reflects the existing hierarchies but also reinforces them, preventing serendipitous ad hoc role reversals or shifts within hierarchies that might occur in a traditional classroom. The online teacher wishing to turn over control of a class to his or her students may face technical obstacles that make it difficult, awkward, or for some systems, impossible to achieve.

At the heart of the LMS is a system of security, authorization, and access control that allows learners only to enter into course spaces in which they are enrolled, and in many cases links to other components of an institution’s student information system. Most LMS systems create an opening page that links students directly to the courses they are registered in, as well as to a variety of other student services such as the registrar, libraries, student clubs, and so on. Thus, the LMS becomes a sort of personalized portal to the services provided by the institution.

In the early days of online learning, there was a proliferation of homemade and/or unintegrated systems, sometimes composed of repurposed groupware such as Lotus Notes. While several of these were well tailored to the needs of their communities, lack of integration across courses and programs, a disjointed user experience, and above all, the difficulties of maintaining, developing, and sustaining such systems led many to ossify or degenerate into disuse. Nowadays, many institutions support only a single, centrally managed LMS system, to minimize technical support issues, so that both learners and students can become familiar and competent users throughout their time of enrolment with that institution. Similarly, to enhance ease of use, most LMS systems use single login systems so that users need to remember only one username and password to access all of the institutions’ services.
LMS systems continue to increase the number and variety of modules available to instructors, in a “Swiss Army knife” approach that is designed to meet as many teaching needs as possible, while maintaining complexity and choice at manageable levels. Key components of modern LMS systems include organization and display tools with options for printing content on demand, calendars with important dates, quiz creation and administration, asynchronous text conferences, real-time text chats, group space for collaborative work, and drop boxes and grade books for assignment. All of these tools are integrated, and most are equipped with push capabilities such that new activity triggers notification by email or Rich Site Syndication (RSS). In the competitive drive to entice more customers, LMS developers are adding tools regularly, including ones more commonly associated with network learning such as blogs, wikis, and e-portfolios.

One particular developer, Blackboard, has captured a significant portion of the commercial LMS market, especially since acquiring competitors such as WebCT and Angel. There is intense competition from smaller companies and products such as Desire2Learn and GlobalScholar, but it is hard for them to make inroads where Blackboard is already incumbent. To some extent Blackboard’s commercial success is inevitable: once an institution chooses an LMS vendor it tends to lock into using it, since the costs of transition, training, and content migration inhibit subsequent movement to rival brands. This means that being first comes with a lot of “stickability,” and Blackboard has—understandably enough for a commercial company with a strong interest in keeping the cash flowing in—not gone far out of its way to enable migration and export.

The main competition for Blackboard comes from outside of the commercial sector. The open source movement has been very active in developing and delivering LMS products, and recent studies are showing that in the higher education applications, they may even be surpassing commercial LMS products in terms of the number of installations (see, for example, the market penetration statistics at Zacker.org [2014]). The growing number of users of open source LMS systems such as Moodle, Sakai, Canvas, and aTutor (to note just a few larger systems of hundreds available), bear evidence that some learning organizations are attracted to the lower initial cost, volunteer support community, and security of code ownership afforded by open source products.

Early fears that such systems would not be scalable have been put to rest by large-scale adoptions made by institutions like the Open University of the United Kingdom (which uses Moodle), who have also contributed generously to the system’s development, as Athabasca University in Canada has done, and many
others. Similar to other successful open source software, a variety of companies are now offering training, support, and integration services for these products, in an attempt to meet the needs of institutions that do not wish to develop these services in-house. Interestingly, as Dawson’s (2012) article details, even Blackboard has absorbed companies providing Moodle hosting in a move that surprised many industry followers.

A quick look at the many orphaned applications distributed on the SourceForge repository of open source products reveals that it is much easier to create and release the first version of an open source software package than it is to gather and sustain a community of active developers. Nonetheless, examples such as Apache, Linux, and the LMS systems mentioned earlier prove that it is possible to develop and maintain very sophisticated products over extended periods of time using open source development tools and ideals. Many institutions either making the leap into learning management systems for the first time or fed up with the high costs and lack of flexibility of commercial systems are moving to open source environments. However, while they offer many advantages, like all such systems, portability of data remains an issue. Moving from one system to another, even when both support standards such as SCORM, is often a painful experience, and lock-in, whether deliberate or unintended, is a feature of almost any centralized environment.

An alternative model of hosting in the Cloud has developed in recent years and has been enthusiastically taken up by many smaller institutions, especially schools that do not have sufficient resources of their own to manage the complex software and hardware typically needed for self-hosting. In some cases, governments or consortia that work on behalf of a collection of schools or colleges manage such systems, in others they are directly paid for commercial services, and in others still they are supported by advertising or, occasionally, are free. The risk of such services is primarily in their reliability—terms of service may change, or companies may become bankrupt. However, there are other concerns: ensuring the privacy of their users is especially important where data protection laws are not strong (such as in the US), and they will sometimes be slower than campus-based alternatives. Even if their performance, reliability, security and privacy are sufficient, data portability is a significant concern. If users and their content are bound up with a particular system, the difficulties of moving to another platform are potentially much greater than even a locally hosted server may present. This is particularly significant if the interface plays an important role: even if data are

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portable, they may still be unusable outside the original platform without the means to present them effectively.

Synchronous Group Tools

*The need for virtual teams to operate in real time (vs. distributed time) is expected to become more critical as tasks become more complex.*

*Bradford S. Bell and Steve W. J. Kozlowski, “A Typology of Virtual Teams”*

Synchronous activities raise the visibility of all group members, especially those who use the media more effectively. Moreland and Levine (1982) argue that visibility is a key determinant of group participation, and thus group performance. Early forms of group-based online learning used audio or text chats, which were augmented by video to become ubiquitous web conferencing software (Skype, Collaborate, Connect, etc.) used in formal education, business, and personal applications. These synchronous tools have evolved into immersive environments that have attracted much interest from early adopters and researchers, but few sustained educational programs or courses make extensive use of them.

Synchronous activities bring a sense of immediacy and efficiency to group processes. Although we remain appreciative of the increased freedom, choice, and reflection affordance of asynchronous groups, we are aware that many students and teachers prefer the increased sense of camaraderie that often develops quickly through engagement in synchronous activity. In a comparison of asynchronous and synchronous courses, Somenarain, Akkaraju, and Gharbaran (2010) found increased student learning, perceptions of learning, motivation and effectiveness of communications among synchronous groups.

Effective group processes are based on trust, immediacy, and a sense of the presence. Although examples from courtship by mail to the development of social presence in asynchronous text discussion demonstrate that it is possible to develop effective educational groups through asynchronous communication, synchronous communication has many advantages.

First and most important is the sense of immediacy provided by real-time or synchronous communications. Albert Mehrabian defines immediacy as communication behaviours that “enhance closeness to and nonverbal interaction with another” (1969, p. 213). He focused on non-verbal cues that are greatly restricted in many forms of online behaviour—notably those that are text-based. But immediacy also carries a sense of immediate reactions, ones that are rich in body language, voice intonation, and facial expression.
Many researchers have studied the link between educational goals and teacher immediacy (J. Anderson, 1979; Frymier, 1993; Gorham, 1988). Generally these studies find that teacher immediacy increases student motivation to learn, student enjoyment and persistence, and to a more limited degree, cognitive outcomes. Teacher behaviours associated with immediacy include use of humour, self-disclosure, addressing students by name, and asking and answering student questions. Finkelstein (2006) argues that synchronous teaching, with implied increases in immediacy, is associated with each of Chickering and Gamson’s (1987) oft-cited Principles for Good Practice in Undergraduate Education—notably increasing student–faculty contact, student cooperation time on task, feedback, and increasing diverse ways of knowing.

Despite these endorsements, synchronous learning activities are also associated with diminishing accessibility. Not all participants may be available at any given time, and the necessity for participants to gather in a single virtual place or have access to particular and often expensive equipment cannot always be met—especially if full-screen video is demanded to maximize the visibility of subtle non-verbal communication and body language. In our experience of online teaching, we have found that occasional use of synchronous technologies allows for quick bursts of immediacy that help forge group cohesiveness and serves to pace and synchronize the group, but it is best to make restrained use of the tools. Increased pacing leads to reduced learner control (Dron, 2007a, pp. 81–82).

Another drawback of synchronous activities is that they can and often are used to support regressive mimicking of classroom-based and lecture format teaching that not only bores learners but also fails to take advantage of new pedagogies and learning activities afforded in cyberspace. The familiar experience of teacher-led instruction can be transported online with regular video conferencing sessions. However, our experience has shown that the increase in complexity from dealing with off-site issues as well as impairments to clear visualization and auditory interaction create frustrations for those expecting “the same, only at a distance.” For such sessions to work there is a need to provide plenty of support and a thorough grounding in protocols to avoid confusion and failure, like ensuring an adequate gap between asking a question and expecting a response, avoiding talking at the same time, avoiding real-world distractions, and the appropriate use of text chat. It is also often a good idea, especially in large groups of novice users, to allocate a second moderator to help manage technical issues. Effective groups therefore tend to make use of synchronous technologies judiciously and ensure that the convenience cost is warranted by collaborative interaction.
Synchronous learning activities come in a wide variety of formats and media. Both audio- and videoconferencing were used extensively in distance education formats for many years before their migration to cost-effective web technology. Text chat was the first and still the most common form of synchronous online interaction, and was even used as the primary tool in the earliest forms of immersive interaction (for example MOOs, MUDs, and Palaces). Text chat is, however, dependent upon typing skills and therefore is associated with the development of shorthand forms and lingo that can exclude new users from group interaction.

We are most impressed with web conferencing software as cost-effective and accessible group educational technologies (for example, Elluminate, Adobe Connect, WebEx, LiveMeeting, DimDim, etc.). Web conferencing supports multiple forms of synchronous interaction, including voice, text, low-resolution video, and presentation support. In addition, most systems support drawing on whiteboards, breakout rooms, application sharing, polling, and group excursions in cyberspace. From an accessibility perspective, web conferencing allows very easy recording and later playback for group members who are not able to attend real-time sessions. Recently, student response systems have been used in classrooms, and early results are showing increases in enjoyment, attendance, and even learning outcomes (Radosevich, Salomon, & Kahn, 2008). Student response through polling is a standard feature of most web conferencing systems for online use, thus providing a tool that enhances learning at a cost that is much lower than that associated with distributing “clickers” to campus-based students.

The use of synchronous interaction is also related to the complexity of group tasks. Simple dissemination of content (as in a lecture, or a reading in a textbook or article) likely gains little from synchronous interaction. But as the need for negotiation and collaboration increases, so does the need for real-time interaction (Bell & Kozlowski, 2002).

In our work, we have evaluated the effectiveness of extending groups across multiple schools to teach high school courses to rural students via videoconferencing technology. We found that although the videoconferencing has value, especially in terms of enrichment, along with professional and administrative value for teachers, as a primary tool for distance education it creates a rather impoverished and teacher-centric learning environment (T. Anderson, 2008).

**Immersive Worlds**
What for decades has promised to provide the most engaging form of synchronous activity is that which takes place in immersive environments such as SecondLife,
Project Wonderland, or Active Worlds. We have studied early examples of formal educational encounters in immersive environments, and conclude that group-enhancing forms of cognitive and teaching presence can be developed in these environments and that opportunities for greatly enhanced social presence abound. McKerlich and Anderson argue that “as the tasks a virtual team is required to perform become more complex and challenging, requiring greater levels of expertise and specialization, a higher premium is expected to be placed on synchronous workflow arrangements and the roles of individual team members will be more likely to be clearly defined, fixed, and singular” (2007, p. 34).

However, at the time of writing, there were numerous hurdles to overcome before such systems enter the mainstream. It is hard to learn to use them, with different controls and capabilities from one system to the next, and complexity in even simple tasks such as moving around. Although touted by their creators as the “3D web,” nothing could be further from the truth. Only the most primitive of steps have been taken to enable a truly distributed and open environment like the World Wide Web in 3D immersive spaces. It was something of a breakthrough when, in 2008, IBM technologists were able to teleport an individual (without clothes or distinguishing features) from one immersive environment to another, but little mainstream development has occurred since then. Technologically, such environments still require powerful machines to operate effectively, and so far, nearly all rely on separate downloadable software as opposed to running in simple ubiquitous clients such as web browsers. This state of affairs may not last long, however. In specifications for HTML 5, real-time, 3D, and immersive environments are being considered. Various real-time technologies are already fairly advanced—Google’s Shuttle5 (code.google.com/p/shuttle5/) provides Jabber chat and uses HTML5 support for websockets, an emerging standard for enabling various protocols to work within web browsers.

Both Google and the Mozilla Foundation are working on ways to enable virtual immersive spaces within the browser, which may lead to standardization and distribution beyond the isolated server spaces of today. If and when this occurs, we may see the flowering of a 3D immersive web, perhaps developing into something not too far removed from William Gibson’s original vision of cyberspace.

**Group Toolsets in the Cloud**

The ever-present closed email list has been and continues to be the workhorse of many effective groups. Email has reached a saturation point in many schools and workplaces such that one can count on learners having access to email and
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the ability to check their accounts regularly. This familiarity with the tools, in addition to the “push” to the attention of a group means that many groups in both formal and informal learning contexts rely on the group mailing list as the primary means of communication. Recently, large Net companies (Yahoo and Google Groups) and new Web 2.0 companies (MySpace, Facebook, etc.) have expanded and integrated new features into their group email tools to create rich group work and learning environments. These collections not only support email but also retain and organize email posts in web formats so that group members need no longer store individual copies of email in their increasingly full mailboxes. Rather, they can search and retrieve postings from the group archive. This is very useful for learners who join the group at a time after group communication has already begun. These systems also support a host of add-on features such as common calendaring, document sharing, picture archiving, group to-do lists, polls, surveys, and other tools designed to afford both synchronous and asynchronous communication among group members. A number of companies have recently stepped into the realm of educational service provision, offering richer and well-managed learning environments for group use in classes where existing tools are weak, such as Udutu and CourseLab, as well as many hosted versions of existing LMS products like Moodle and Blackboard.

EFFECT OF GROUPS ON ATTRITION

Distance learning has notoriously high attrition rates, though this is by no means true across the board (e.g., Guilar & Loring, 2008). Among the many things that help to reduce attrition rates, a central pillar is social support. While there are many factors that can lead to attrition and many mitigating factors that reduce it, sustained motivation is essential. It is very easy, without cues like the requirement to be in a particular place at a particular time, to allow other things to take precedence, so motivation plays a crucial role in success to a greater extent than it does in face-to-face learning. Ideally, that motivation will be intrinsic: rather than being coerced, cajoled, rewarded, or even working to achieve goals that align with self-image and self-worth, it is better by far to simply want to do something in the first place. However, intrinsic motivation is easily undermined; often by the very things we try to do to achieve it in the first place, such as reward systems or punishments (Ariely, 2009; Deci, Vallerand, Pelletier, & Ryan, 1991; Kohn, 1999).

According to Deci and Ryan (2008), there are three distinct components to intrinsic motivation. As a rule, if learning tasks give people control, are within
their range of competence, and provide relatedness with others, they will enable intrinsic motivation to emerge. Without any of those features, intrinsic motivation is almost certain to be quashed. Although the relatedness portion of this triangle may emerge in, say, family settings, friends, social networks or public acclaim, a system for learning that embeds sociability is far more likely to succeed than one that does not. A social component is therefore an extremely important means of avoiding attrition. There are many examples of this recorded in the literature. Royal Roads University, an online Canadian institution, famously achieved completion rates approaching 100% by employing the relatively simple technique of fostering cohorts, groups of mutually supporting learners who helped one another when the going got tough, even averting disaster in classically dangerous times such as changes in job, bereavement, or illness (Guilar & Loring, 2008). A closed group is especially effective at providing such support because shared goals and values, combined with a culture of mutual support, can help to foster strong community ties.

**EFFECT OF GROUPS ON SELF-EFFICACY**

Self-efficacy—the belief that a learner can accomplish a goal—has long been associated with performance and persistence (Bandura, 1977) and resulted in a major theory and considerable study of self-efficacy in both classroom and distance education. In a major review of the sources of self-efficacy, Usher and Pajares (2008) isolate four sources of self-efficacy found in the considerable research literature. The largest source is mastery: having accomplished one goal leads to confidence that additional goals can be achieved. But after competency, the next two sources are decidedly related to social interactions that are common in group interactions. The first of these is labelled “social persuasion”: inducements made by other group members and especially teachers increase a learner’s sense that they can accomplish a challenging learning goal. Perhaps this is most clearly visualized in the sports group, where the coach and teammates’ almost continuous communications that “you can do it” are vivid social persuasions leading to increases in self-efficacy. The second source of socially induced self-efficacy relates to vicarious experiences, where learners are able to observe the success of peers and come to believe that they too can achieve these goals. Obviously the intense interactions that define group activities give rise to many opportunities for such vicarious experience, with resulting increases in self-efficacy.
As we have already observed, groups differ from networks inasmuch as they tend to have:

- Structure and leadership
- Fixed periods of operation and identifiable stages of development
- Explicit membership

However, things are complicated by the latent possibility that groups may evolve into networks and back again. There are two distinct ways for designers to cope with this:

1. Ignore the problem and leave the network aspect to a different application or applications.
2. Build support for transitions to network modes into the software itself.

We favour the latter solution. We will start, however, by briefly examining the features needed to support group modes. We will not go into great depth on this topic: software to support group interactions has been available for several decades, and we do not intend to suggest new or revolutionary approaches to its design here, apart from in terms of the transition to network modes of interaction.

**Structure and Leadership**

Software designed for groups needs to embody roles that provide affordances, capabilities, and levels of control to different people.

It should be possible to see the mapping between the group structure and the individuals and resources composing it. In other words, we should be aware of the organizational structure of the group, with clear signals for different roles. This may be as simple as labels or icons to indicate that a person is a teacher or group leader, or it can be more sophisticated. For example, we could display the organizational structure as a tree, or indicate ownership of resources and discussions by images or text.

**Fixed Periods of Operation and Identifiable Stages of Development**

- Any group system should be capable of having a specified beginning and end date/time.
- Resources and discussions for groups should have the facility for expiring or archiving.
As groups pass through various phases, they need different kinds of electronic support, and these should not be mixed up. For instance, relics of experimental sharing and learning should not persist once groups have become self-sustaining and apply knowledge critically. Allowing or requiring resources and discussions to expire (or to be sidelined through archiving) is one approach to dealing with this issue. Another is to parcel the learning landscape in order to keep spaces associated with different development phases separate.

**Explicit Membership**

Groups imply membership, which also implies that those outside the group need to be excluded. Any application supporting groups needs explicit controls over not just authentication but also authorization. In addition, such a system needs support for subgroupings, including groups of individuals and the virtual spaces that they use. For example, this may be used to separate spaces for subgroup interaction (a common feature of LMSs), or at a higher level, to separate out instances of courses. This leads us to consider transitions from group to network modes.

**Transition from Group to Network**

It is not uncommon for groups to evolve into networks, especially in educational applications. Typically, people who have been in a class together may stay in contact, and even if they don’t there is a great deal of potential value in using the alumni of a given course to provide support, encouragement, and other benefits to new cohorts.

Unfortunately, many systems primarily designed for closed groups (including most LMSs) do not make it easy to do that, and such networks tend to arise despite the system’s design rather than because of it, through email or other more network-friendly social applications (Facebook groups, for example).

To support the transition from group to network modes, it would be better if designers developed group applications that fade into networks rather than those that abruptly end. The common approach to closed course management that is used in many institutional LMSs is to archive old courses when they have ended, thereby ending a given student’s association with the course. Indeed, data models behind the applications enforce this by requiring separation for each instance a course runs. Because of the data models behind many LMSs, there is little alternative to this approach because were we to leave ex-students and their discussions active, it would be confusing to new cohorts. In unpaced/self-paced learning there are further problems as, without a specific cohort to be a member of, relics
of old discussions can quickly evolve into a chaotic tangle that is counterproductive in learning. In a paced (cohort-based) course it is very valuable to make use of subgroupings for each instance of a course, but to maintain either a supertype or superclass of the course that allows users to maintain membership in the broader network.

For unpaced courses, the problem is more complex. Learners who progress through a course at their own pace, typically with discontinuous overlapping start and finish times, are in some senses a group with shared goals, a hierarchical organizational structure, clear membership and so on, but in some senses they are a set because individual ties are typically very weak, and while purposes are shared at the large scale of the course, areas of interest at any given time will typically differ.

CONCLUSION

In this chapter we have overviewed both the power and liabilities of group models of teaching and learning. Groups can be used by educators to create the support, solidarity, and community that encourage learners to continue the often-strenuous work of effective learning. They are also important vehicles for transmitting the cultural capital, often referred to as the hidden curriculum, which is associated with the experience of formal education.

The benefits are balanced with the tendency for groups to suffer from group-think and serve as cliques that bar access for some to group privileges. In formal education, groups often suffer from teacher dependency than doesn’t allow learners to practice the skills or develop the self-efficacy attitudes associated with self-directed and lifelong learning. Nonetheless, we have seen the evolution of groups from place-based entities to ones that can thrive and be effective in blended online and place-based format, and on to groups that operate effectively with only online interaction and collaborative work.

There are some notable downsides to the use of groups, one of the largest being that such approaches typically impose heavy restrictions on time and pace, and distribute control in ways that may not benefit all learners. Beyond these problems, they scale badly and are very expensive to run (Annand, 1999). The organizational complexity of managing large numbers of group-based learners and the effort involved in sustaining group technologies means that more innovative ways need to be found to gain the benefits of groups at a lower cost and without the concomitant loss of learner control that they necessarily entail.
Connectivist pedagogies appear to offer such an alternative, and with that in mind, in the next chapter we move beyond groups to the fluid and emergent structures we refer to as networks.