

Leveraging online communities in fostering adaptive schools 4

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Abstract There has long been a call for schools to prepare students for the twenty-first 11
 century where skills and dispositions differ significantly from much of what has historically 12
 characterized formal education. The knowledge based economy calls for policy and 13
 pedagogical efforts that would transform schools. Schools are to foster communities of 14
 learners. This paper suggests that para-communities may be points of leverage in the 15
 fostering of adaptive schools. A critical analysis is done on the differences between para- 16
 communities (such as online communities) and schools; and an argument is made that they 17
 each serve differing goals and should be left distinct because they achieve different societal 18
 and economic demands. 19

Keywords Online community · Community of practice · Adaptive organization · 20
 Adaptive school · Paracomunity · Community of interest · Community of learners · 21
 Trust-networks 22
 23

Introduction 24

Recently, there has been emphasis that assessment should be focused for learning rather 25
 than on placement and high stakes examinations (Shepard 2000). This is with the view that 26
 schools would run the danger of being irrelevant in the twenty-first century if such be the 27
 continued emphasis. Concomitantly, there are also calls for individuals being more 28

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innovative and adaptive—see, for example, the notion of Bransford et al. (1999) of Adaptive Expertise—which are essential skills and dispositions necessary for the twenty-first century. In this paper, we attempt to describe a collective notion of expertise in the form of Adaptive Schools (our proposed variation from adaptive expertise). Using the notion of adaptive schools, we argue that traditionally oriented schools should leverage para-communities such as online communities in their attempts to be adaptive.

Our arguments are contextualized within the education system of Singapore. Singapore has established a reputation of having schools with students who are able to perform well in certain standardized tests, as measured against international norms. In addition, at least three other factors have contributed to a system of formal education in Singapore which is characterized by high-stakes and high-pressure. These are: Singapore's close ties with examination boards in the UK, due to her colonial heritage; a fairly pervasive culture of deference to teacher-authority figures during regular class time, which can be traced back to a strong Confucian ethic; and finally, the competitive nature of Singapore's society due to her lack of natural resources and small land area. Taken together, these characterizations would not bode well, when viewed against the socioeconomic imperatives of independence of thought, critical and creative thinking, and adaptability, which could be seen to constitute essential traits of lifelong learners operating effectively in a knowledge-based economy.

As researchers and practitioners in such an education system, we are, therefore, acutely aware of the tensions between historico-cultural momentum, vis-à-vis the personal and societal dispositions necessary in an altogether more uncertain future. Given this background, we seek to characterize adaptive schools as both efficient and innovative, and as schools which capitalize on various forms of social capital. Social capital is closely related to trust and mutuality between parties. We posit that traditional hierarchical organizations and schools are designed for efficiency while informal communities are more innovative by dint of their self-evolving orientations. Researchers (e.g., Wenger et al. 2002) have been promoting the idea of situating Communities of Practice (CoPs) within organizations to improve adaptability. We argue that this approach is not epistemologically viable. We contend that by commutating CoPs into organizations, we may instead nullify the unique strengths of CoPs. To us, these so-called CoPs are at most Communities of Interest (CoIs) when formed within an organization. We suggest that CoPs should instead be promoted as para-communities outside of organizations and schools.

Due to the recent currency of CoPs, the intuitive stance is to try to infuse the concept of CoPs into organizations (Wenger et al. 2002). Wenger et al. (2002) also suggested the fostering of CoIs within organizations—a congregating of like-minded individuals with a work-related common interest(s). In response, we are suggesting a two pronged approach: (a) to situate CoIs into organizations and (b) to have organizations complemented with para-communities. The second stance is novel compared with Wenger et al.'s recommendations. We recommend CoIs to be interfaces or mediators between organizations and para-communities. These CoIs should be focused on work related interests and passions and how these translate to interactions with related para-communities. Examples of CoIs include special interest groups within organizations. Because these groups may not always be associated with formal workplace activities, individuals are more willing to bring ideas to the forefront.

We argue in the paper that schools have quite different goals and demands to achieve compared to para-communities or CoPs. The goals of schools and para-communities are complementary and should remain distinct. This recommendation arises from the importance of developing social capital where individual members can potentially belong to different CoIs within the organization with linkages to online communities, para-communities or CoPs outside the organization-school.

In the context of this paper, we position traditional K-12 schools as a construct loosely defined as an organization. CoPs differ from traditional organizations, schools, or institutions in that the former are self-evolving and the latter are probably hierarchical in structure. CoPs are communities of people who practice a profession oriented toward a code of conduct, ethics, history, and peculiar culture (Hung et al. 2006; Wenger et al. 2002). Members of such communities share similar concerns and passions, allowing them to collectively evolve the necessary structures and processes to deepen their expertise and knowledge through engaging one another in an on-going basis as new members join (Barab and Duffy 2000; Tan et al. 2006). CoPs have the cultural context to develop individuals by fostering their common professional dispositions and interests.

As for para-communities, an example would be alumni gatherings, during which individuals come together from various professions and form relations, networks, and other forms of social capital.

Organizations, on the other hand, are more inclined toward developing individual skills and competencies because they are primarily tasks-focussed. Both communities and organizations play a complementary role. In today's global village, where there is much inter-relatedness in professional practices, one can never accurately predict how and when past and present relationships formed can be an asset to a particular instance or situation. We argue in this paper that these para-communities are useful to organizations.

In the subsequent sections, we begin by describing online communities and compare them with Communities of Learners (CoLs) as efforts to foster communities in schools. We then claim that school efforts and para-communities such as online communities differ significantly in terms of motivations and goals of participants. Based on the analysis and our understanding of community theoretical positions, we make recommendations as our contributions to this paper. We introduce the notion of social capital to substantiate our analysis. Most organizations, including schools, are by orientation efficient, but in order to stay competitive, they need to innovate. Efficient schools basically structure themselves in preparing students for the traditional high stakes examinations. We suggest that social capital cultivates innovation in organizations. Moreover, this innovativeness can be capitalized upon, through CoIs and para-communities. In order to explain our conceptualization of adaptive schools, we discuss the issues of scale, locus of control, and goals that influence the different ways organizations can potentially be oriented toward adaptability. While we use "organizations" as a generic term, schools are our focus in this paper.

Online communities as para-communities

Online communities have become increasingly common in recent times. An online community essentially can be defined by the following characteristics (Preece 2000):

- People, who interact socially as they strive to satisfy their own needs or perform special roles, such as leading or moderating;
- A shared purpose, such as interest, need, information exchange, or service that provides a reason for the community; and
- Policies, in the form of tacit assumptions, rituals, protocols, rules, and laws that guide people's interactions.

As such online communities are centered on social practices, and technologies of the Internet facilitate collaborations across physical spaces. Often, they exhibit a high degree of innovation and are almost always self-initiated. The popularity of online communities has

been on the rise in recent years. Some of the earliest online communities, still in existence today, are epinions.com and experts-exchange.com (see Hung and Chen 2002). These have been able to capitalize on distributed expertise available over the World Wide Web. At epinions.com, participants provide varying recommendations or opinions on a wide range of topics, such as books, appliances, and everyday issues. Such communities tend to be self-organizing because contributors are strongly motivated to build the knowledge base and thereby enhance their own reputations.

In more recent times there has been a proliferation of folksonomic communities. The term “social software” has been used to describe a range of online infrastructure including Internet discussion boards, instant- and text-messaging, blog hosts (e.g., www.blogger.com), social bookmarking tools (e.g., del.icio.us), wikis (e.g., en.wikipedia.org), and media sharing portals (e.g., www.flickr.com). It is also evident that when we refer to youth cultures we recognize that the younger generation (Gen-Y) is growing up as digital natives (Prensky 2006) in such a milieu, and there is an increasing need to study, harness, and extend their emerging digital media literacies.

The pervasive use of the platforms collectively known as Web 2.0 among young people is typically around the sharing of music, pictures, and opinions—as yet, they are less likely to be found in domains of schoolwork (or what is typically referred to as formal learning). Via these platforms, people express their evolving identity and views through the sharing of personal reflections and social interactions. This fosters a heightened sense of ownership. Research into games for learning (e.g., Squire 2004) shows that individuals can embody virtual identities and experiences in the form of avatars. Multi-user games are another such social space in which members of Gen-Y are engaged intensely.

The tools arising from Web 2.0 technologies represent great potential for the facilitation of collaborative learning and situated cognition. The rate of change of Internet technologies in general, coupled with the breadth of tools under the collective banner of Web 2.0 in particular, pose significant challenges for curriculum design. As recently as the mid-1990s, decisions could have been effectively made by small groups, as were typically found in traditional hierarchies represented by steering committees. At the time, there were technological and organizational limits to the degree to which intelligence could be distributed and socially mediated.

Today, there is a democratization of views—with the consequent threat/ opportunity of flattened hierarchies—because anyone’s views can be represented. In the past, expert knowledge was found in specific individuals in limited localities—indeed, this is still the case in some societal institutions. Increasingly however, there is a growing, influential, and informed body of expertise and opinions from the masses, and it is one which owes its influence and self-sustainability to social software.

In terms of affording situations and timeliness in cognition, Web 2.0 tools also facilitate updates of information. The situated argument is strengthened when individuals can be provided with tools and information which helps them in decision making in just-in-time ways. RSS webmasters put content into a standardized format (known as feeds) for users, which can be viewed and organized automatically as new content is updated by the respective websites. Programs which serve as aggregators can check a list of feeds from webmasters on behalf of a user and display any updated articles that they find.

Friedman (2007) has commented how so-called trust-networks (and other forms of social software associated with Web 2.0) are working to subvert the role that hierarchical organizations have traditionally played in regulating socioeconomic flows. Indeed, Rheingold (1994) has observed that the factors which make or break a community—be it face-to-face or online—are issues of trust and identity, clarity of purpose, and boundaries.

As contributors to such online social networks establish their credibility in sometimes esoteric subjects, their respective authorities are established in ways which transcend national, corporate, and institutional boundaries. This stands in contrast to communities which are organized by a dependence upon face-to-face contact, and consequently upon regular synchronous meetings. The liberation from co-location in both space and time, as afforded by online social networks, permits individuals not only to organize themselves spontaneously along a much greater breadth of interests—as described in Anderson's (2006) Long Tail hypothesis—but also to adopt new identities beyond their personae in “real life.” One of our contentions of the present paper is that increasingly, the skill sets and expertise built up through the assumption of these online identities (such as Guild Leaders in *World of Warcraft*) are recognized as being increasingly relevant to regular “offline” learning environments and workplaces.

Our position holds equally true for Multi-User Virtual Environments (MUEs)—as typified by *Second Life*—as it does for the Massively Multiplayer Online Role Playing Games (MMORPGs). Whenever individuals stand to benefit from a reciprocal relationship with others in the community, mutuality is fostered. Within these communities, specific forms of genre patterns evolve as participants engage with each other. Because of the characteristics specific to each virtual world, unique organizations of community eventually emerge, such as the Builders and Scripters in *Second Life*.

After some time, members of the community begin to appropriate these forms and propagate them. During this process, Hung and Chen (2002) recognize that (a) the *intensity* of participatory membership in online communities can be greatly increased, (b) a better *representation* of the community's view can be exhibited, and (c) information, resources, and expertise can be more *accessible* to members.

Although the social phenomena and dynamics of such collective networks are congruent to all the recent notions of social cognition, situated cognition, and distributed cognition, online communities are typically not designed around intentional learning. In other words, learning is not a goal in these social spaces. There is no doubt that much learning can occur incidentally in these environments as congruent with the situated learning arguments.

Communities of learners

The preceding description of online communities can be contrasted with the body of literature on CoLs. Bielaczyc and Collins (1999) stress that CoLs are characterized by explicit and intentional goals of learning. A learning community is one which is cohesive and has a “culture of learning such that everyone is involved in a collective effort of understanding” (Bielaczyc and Collins 1999, p. 2). In a learning community, both the individuals and the community as a whole are learning how to learn and knowledge is constructed through involvement in the community's shared values, beliefs, languages, and ways of doing things. Bielaczyc and Collins (1999) identified a learning community as having the following four characteristics: (a) diversity of expertise among members; (b) a shared objective of advancing collective knowledge; (c) an emphasis on learning how to learn; and (d) a mechanism for sharing what is learned (Bielaczyc and Collins 1999).

One of the most significant tenets for a successful online community is that its members need to be organized around a “structural-dependence” principle. “The community should be organized such that students are dependent on other students' contributions in some way. It is important to have a valid reason for students to work together in a way that makes sense to the students, such as around common tasks that require joint effort” (Bielaczyc and

Collins 1999, p. 288). Hung and Chen (2002) extend the structural-dependence principle by elaborating on the two factors identified: infrastructure (referring to the “structural”) and interdependency (referring to the “dependence”). Specifically, infrastructure refers to the supporting structures such as the rules and norms supporting the activities of the community; and interdependence refers to the workings and complementary roles of the members of the community toward its goals. Many other authors (see studies reported in Barab, Kling, and Gray 2004) also make similar observations that a community is formed not because of the provision of an online environment per se, but instead through the evolving socio-technical design supporting the community (e.g., see Schlager and Fusco 2004), namely the social networks that are formed through the supporting technical infrastructure. Indeed, there are few successful CoLs for teachers—a notable exception is the Inquiry Learning Forum (Barab et al. 2004). These communities become successful only when they are able to foster ownership, purpose, and the needs of teachers beyond the traditional bounds of their professional work.

As iterated above, a major difference between online communities and CoLs is that learning as a goal is intentional in the latter while the former is about satisfying personal goals and other forms of authentic challenges and problem solving, and during which learning is incidental. Another fundamental orientation in CoLs is that schools are perceived and criticized as insufficiently authentic with respect to CoPs (Communities of Practice; Hung and Chen 2007). In other words, schools are not sufficiently fostering the disposition toward disciplinary practices such as in mathematics and the sciences. While it is acknowledged that schools try to make learning more authentic by engaging students in practices that approximate what actual practitioners do, social-cultural oriented studies have found that the work of scientists is fundamentally situated (Latour 1987, 1993) in that the practices and knowledge of the science emerge from a dynamic process of construction. Congruent to literature on CoPs (Hung et al. 2006), meanings are embodied in the artifacts; inseparable from the context in which they are created. This viewpoint highlights the importance of context in which science knowledge is constructed within which meaning is mutually constitutive. Scientific practice is a crucial constitutive part of the scientific meanings generated. That is to say, the CoP is the best place to learn the practice itself.

The *simulation* of authentic construction of meanings in any given practice requires being as close to the professional practice as possible, such as through the simulation of discipline-specific genres and discourses (O'Neill 2001). Hence, science learning can be simulated via a learning community that emphasizes appropriate genres, such as the use of the phrase “my hypothesis.” Students are engaged in an active collaboration, fostering an emerging discussion about scientific topics in an attempt to simulate the interactions among scientists. They attempt to develop a common vocabulary and genre to facilitate understandings among the members in the scientific learning community so that they are able to communicate clearly about the knowledge they acquire (Edelson 1997). Through such dialogic engagement, they acquire the tools and techniques that are developed in the practice of science. These tools, techniques, and ways of communication permit them to establish a shared context that facilitates communication within the community. This results in the students’ knowledge being firmly situated in a context that reinforces both applicability and value of that knowledge (Edelson 1997).

Knowledge Building (KB) focuses on improvement of scientific ideas developed through collaborative discourse (Scardamalia and Bereiter 2003), with its key features being the provision of supports for knowledge construction, collaboration, and progressive inquiry. It shares many characteristics of authentic science learning such as the advancement of the frontiers of the community’s knowledge, an emphasis on collaboration

and communication. The CoVis project is a case example of a scientific learning collaboratory that includes students, teachers, scientists, informal science educators, and educational researchers (Edelson et al. 1995). It is developed to promote scientific understanding which is mediated by scientific visualization tools in a collaborative context (Edelson et al. 1999).

There are many other examples of CoLs such as Fostering Community of Learners (FCL), Philosophy for Children, and others. Although there are merits to CoLs, Petraglia (1998) has pointed out that these simulations are a priori (preauthentication) designs. They have missed the in situ epistemological considerations that underpin constructivism and situated cognition. He argues that educational technologists have been preauthenticating learning materials and environments to correspond to the real world rather than fostering learners with the ability to interact with it. At best, such preauthentication makes modeling explicit. However, there is a wealth of implicit and tacit knowledge that exists in environments, experts, contexts, and their relationships with each other. Interactions within the actual social practice of a scientific community are fundamentally rich in social meanings that cannot be adequately simulated by groups of students in schools who do not possess the implicit wealth of scientific understanding.

Returning to online communities and their successes, there are currently many educational advocates (Preece 2000) of online communities. However, with the emphasis on intentional goals of learning, it is our position that CoLs have been confused with online communities of para-communities. As such, we see limitations on the extent to which these CoLs would work. From the preceding literature, we recognize that there are some commonalities and differences between online communities (informal learning settings) and CoLs (formal learning settings). The commonalities include: (a) the need for structural-dependency among members, (b) satisfying some demand or need (in online communities, a self-created need whereas in CoLs, the need is usually suggested by the curriculum and teacher), and (c) trying to derive collective wisdom rather than from respective expertise of individuals, and in the case of sufficiently large participations, there is a democratization of views and a greater sharing of resources.

The differences between online communities and CoLs are: (a) unlike the latter, online communities are not subject to formal assessments of students' performance; (b) motivational dimensions of participation differ greatly, because in online communities, it is intrinsic whereas in the case of CoLs, it is inclined toward the extrinsic; and (c) CoLs can hardly foster identity and dispositional enculturation of practices, when online communities define their own realm of sharing and beliefs—identity formations not necessarily tied to any specific practice.

In the view of Wenger et al. (2002), communities foster identity dispositions in a particular practice because of the provision of a place and process. The place is where the members interact and is the situated context of the practice. It should be noted that this quality of "place" does not necessarily predicate a synchronous face-to-face meeting in a location in "real life"; "place" can occur just as much in MUVES and MMORPGs. As for the process, this refers to the particular enculturation of experts and novices in a practice.

Schools can attempt to simulate the process to some degree, but the sense of place of CoPs is hard to simulate. In combination, the place and process bring forth both explicit and implicit dimensions of knowledge and knowing. In other words, schools achieve very different goals compared with online communities/para-communities. Instead of attempting to integrate these communities into schools, our claim is that they should remain distinct and separate. Nevertheless, efforts should be made to make schools and para-communities complementary. We stress that such a complementary approach would then enable schools to be innovative and thus, adaptive to the twenty-first century.

As such, it is our contention that schools which are organized to ensure that students do well for national and high stakes examinations have goals that differ quite significantly from para- and online-communities. In the subsequent sections of this paper, we discuss the role of adaptive expertise vis-à-vis organizations or schools at the collective level, by proposing that a complementary operationalization of both CoLs and para-communities may result in adaptive organizations/schools.

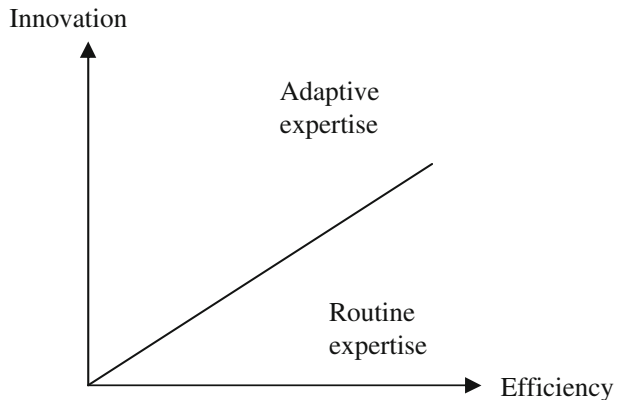
Adaptive organizations

Bransford’s et al. (1999) concepts of routine expertise (or artisans) posit that such expertise is efficient and able to automate or do exactly what their customers need. Artisans attempt to “get the problem solved” within the constraints imposed, as efficiently as possible and then move on to the next task. They could, therefore, be characterized as those that understand “the system” and its routines and get the job done based on the desired operational goals and targets.

In contrast, adaptive experts are able to suggest new ideas to their clients or customers and introduce different perspectives which may be more innovative. They help their clients to see “out of the box.” Compared to routine experts, adaptive experts are more likely to have the disposition for challenges. Adaptive experts are more tolerant of ambiguity and are able to manage this kind of uncertain conditions. They are open-minded and more willing to temporarily suspend their judgments in the view of possibly accepting alternative perspectives to challenges. Adaptive experts are both efficient and innovative (see Fig. 1).

The ability to be an adaptive expert requires individuals to be highly sociable and able to deal with others who may come from diverse cultures. They also need to be level-headed with a good sense of their own and others’ emotions. They need to be culturally sensitive. In other words, adaptive expertise involves habits of mind and ways of thinking that are similar to twenty-first century skills and dispositions (NCREL 2003). The belief underpinning adaptive expertise is that one’s assumptions and epistemology of knowing is that one ought to be open-minded and flexible because the world is constantly in a flux of change. Bransford’s notions of adaptive experts are discussed at the individual-person level. In this paper we extend his concept to the organizational level. We begin by arguing that adaptability is a function of efficiency and innovation.

Fig. 1 Adaptive expertise



An alternative to hierarchical structures typical in organizations is self-evolving phenomena. 346
 Adaptability is one of the central tenets of self-evolving organisms. Such emergent evolution is 347
 characteristic of CoPs, while seldom in evidence in highly structured organizations. 348

The Linux community is an example of a group of computer scientists and engineers 349
 who network to create and improve upon an operating system for personal computing 350
 devices. Specifically, Linux is the creation of an essentially voluntary, self-organizing 351
 community of open-source developers. The origins of Linux arose from a small group of 352
 technologists who were dissatisfied with monopolies by certain large players. With the 353
 belief that a viable operating system could be an open-source initiative, they began to 354
 collaborate in an emergent self-organized manner. One could conjecture that the members 355
 of this community usually hold daytime jobs as computer programmers and in the “nights” 356
 (or any other available time) spend their efforts in enacting their belief system. Over time 357
 these hackers develop social relationships and social capital, and other members in the 358
 Linux community become familiar with their individual expertise. Passion and beliefs 359
 motivate behaviors and actions in communities. Intrinsic motivation is the key driver just as 360
 we have seen in the open-source community. This is in contrast to traditional and 361
 hierarchical organizations in which much of what drives behavior is extrinsic motivation. 362

We argue that an adaptive organization needs to work in complement with self- 363
 organizing communities, and that this complementarity would eventually increase the 364
 degree to which the members of the organization are motivated intrinsically. Communities 365
 begin when members take ownership of the community. Their passion drives them to be 366
 adaptive and to seek and create meaning in their activities. Social networks and social 367
 capital are formed through deep mutual interactions and relations resulting in the evolution 368
 of trust among members. Members of communities look after each other’s needs; they 369
 recommend openings and opportunities to one another; they share ideas and successes with 370
 each other; and they create mutual benefits for one another. In other words, they learn to 371
 survive not just as individual organisms, they survive as a collective entity. 372

Discussion 373

We recognize that in para-communities, members are more willing to experiment with ideas, 374
 take risks, be innovative, share their thoughts, and tread on ambiguity because they are not 375
 under the regime of appraisal or profit deliverables. We also recognize that increasingly 376
 individuals need to be engaged in different kinds of communities in order to develop 377
 dispositions which would be useful to them in their respective organizations. In this paper, we 378
 question the viability of making organizations into CoPs; rather we are proposing that 379
 organizations be structured in such a way that they enable and encourage employees to have 380
 time to participate in communities through the formation of communities of interests (CoIs). 381

We caution that top-down efforts to structure CoPs within institutions and organizations may 382
 not be as productive as originally envisaged by senior management. Instead, if there are social 383
 networks of like-minded individuals who share certain passions and interests arising within and 384
 across organizations, we would characterize them as CoIs (Wenger et al. 2002). CoIs are not 385
 CoPs in that they do not have the mechanisms to be self-sustaining, nor do they adhere to 386
 strong epistemological beliefs (Hung et al. 2006); this is notwithstanding the fact that they 387
 congregate individuals of like-minded interests related to professional issues. 388

Instead, a CoP is a place where members feel secure and a sense of kindred-ness. 389
 Organizations do not traditionally have this characteristic. In contrast, members in a 390
 community are generally not held in competition against each other, and this is a very 391

important consideration for the development of dispositional social capital and mutuality. Social capital comprises active connections among people; it refers to the “trust, mutual understanding, shared values and behaviors that bind the members of networks and communities and make cooperative action possible” (Cohen and Prusak 2001). Dispositional social capital is formed in high trust situations in which individuals are free to develop their ideas and passions—their dispositions—in order to further their innovations in a failure-friendly environment.

An example of the development of an authentic CoP is the case study described in Hung et al. (2006), in which English language teachers in a school cluster in Singapore organized themselves into a learning community centered on their shared professional interest in improving the pedagogy of language learning in their respective schools. Although the idea for the CoP was initially prompted by a suggestion from the cluster superintendent, the teachers in this community have since put in place the structural facility for a rotational system of leadership within this small but growing community.

In the preceding case study, the community arose from within a spatially distinct area of a school cluster (which is an arbitrary administrative construct, not unlike that of the American school district). A central tenet of the argument in the present paper is that increasingly, it is possible to leverage the affordances of Web-based and other online communities—such as those with a presence in virtual worlds—to even greater effect, in that such online affordances permit the incubation, nurturing and growth of CoP across geographically discrete regions.

Professional teachers’ associations stand to benefit greatly from these latter developments. In Singapore, several such associations have long existed, some since not long after the country’s independence in the 1960s. The Mathematics Teachers’ Association, the History Association and the Geography Teachers’ Association of Singapore, are all active professional bodies which provide their respective members with a wide-ranging suite of tools and forums—both online and offline—for the sharing of best practices in teaching and learning. These associations have evolved to remain relevant to their membership base, despite sweeping cultural and technological changes over the decades, as Singapore has emerged as a rural backwater in Southeast Asia to become one of the key economies in the Asia-Pacific in the twenty-first century.

We, thus, propose that organizations and communities stand in a dialectical or relativist relationship where they stand to mutually co-evolve symbiotically. This process will take time and take place across a developmental trajectory that cannot be engineered or designed prescriptively, but can be encouraged or facilitated by strong leadership with a vision for collective adaptive expertise.

On the other hand, we encourage the need for organizations to become less hierarchical and to move toward a more distributed and collaborative form of leadership and management. However, this is not to say that we expect traditional organizations to become CoPs. We are also not suggesting that CoPs are better than organizations; instead by adopting a relativist or dialectical stance, we are suggesting that both have a role.

Implications to organizations and schools

We believe that organizations and CoPs can generally be situated in a multi-dimensional space defined by innovation, efficiency, and social capital. We postulate several determinants of the extent to which each of these axes is accorded a premium vis-à-vis the others. The first such determinant is the *scale* of the organization. All other things being

equal, traditional organizations—especially the larger ones (e.g., General Motors)—need to be structured so as to be managed efficiently. They can be contrasted with CoPs, whose self-organizing characteristics lend themselves more likely to less hierarchical structures, and those which are smaller in scale, for example. In other words, we are conjecturing that scale or size predicates the need to be efficient. As organizations become larger, efficiency becomes more critical.

Another determinant of where communities and organizations find themselves in terms of their respective degrees of innovation, efficiency, and social capital, is the concept of the *locus of control*. In traditional organizations and schools, the locus of control is probably top-down or centralized, while for CoPs, it is distributed. We readily acknowledge that there are assumptions and limitations underpinning the extent to which control can be distributed.

Within CoPs, participation is for the most part voluntary and members take responsibility for, and ownership of, the interactions, hence assuming control at a distributed level. We have argued earlier that such ownership leads to higher dispositional social capital. For traditional organizations, a more centralized control is needed, based on the assumption that the executive level “knows best” and that the organization cannot afford to fail by letting go of the control. This is akin to managing the organization for minimal failure. In contrast, innovative organizations such as Google attempt to be non-hierarchical and adopt a mindset that failure leads to innovation. Instead of preventing failures, it makes genuine failure a Key Performance Indicator (KPI), that is, a precursor to innovation and success.

A third determinant in our model are the *goals* of the organization or community. In the context of schooling, these refer to how the goals of education are defined. If an organization is inclined toward production-oriented goals such as the manufacturing industry, we posit that the nature of such industries is one which places a premium on efficiency. The parallel in schools is when we begin to be overwhelmed with “producing” students with certain competencies for national examinations and the factory production metaphor comes into play.

Efficiency-driven organizations may have a research and development (R&D) arm which explores future opportunities for innovation, but by and large, most of their processes require them to be production-oriented. Likewise, schools which are run according to a factory-production paradigm may have a select group of teachers doing action research, but by and large, the rest of the school is trying to attain placement position at league tables for the relative ranking of schools.

On the other hand, if the goals are oriented more toward the provision of quality services and/or the facilitation for the emergence of a knowledge-based economy, innovation is crucial. As such, it would be more compelling for such companies to be decentralized in order to foster adaptability. Such organizations would over time need to find their own balance between efficiency and innovation. In such cases, an R&D arm alone would be insufficient. Rather CoIs (as proposed in this paper) as an interface mediating with para-communities may be a better alternative. It should also be recognized that the two are not mutually exclusive. Indeed, a company may strive to have both CoIs and R&D arms as complementary initiatives.

Depending on the goals and the directions they intend to forge, organizations should decide whether they need to be more efficiency- or innovation-inclined. We reiterate that both efficiency and innovation are crucial to adaptability. In this paper we have attempted to make a case that global orientations dictate a positioning nearer the innovation end of the continuum. The evolution toward an adaptive organization begins by engaging in CoIs and the consequent development of social capital and ownership.

Summary and conclusion: Toward adaptive organizations and schools

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From the preceding discussion, we have illustrated our thinking along the dimensions of: 488
efficiency, innovation, and social capital. Hierarchical organizations are probably high in 489
efficiency, but possibly lower in innovation and social capital. Conversely, communities 490
which have evolved from grassroots or open-source initiatives—while characterized by 491
innovativeness and high social capital—risk being less efficient organizationally, by dint of 492
their loose and informal internal structures. 493

We characterize an adaptive organization to be one which ranks highly in all three 494
dimensions. It is difficult to achieve such an entity within a singular organization, and large 495
organizations could go some way toward becoming more adaptive, by capitalizing on 496
existing para-communities, as opposed to pursuing a more amalgamative growth-path, such 497
as when Microsoft attempts to absorb or buy up other smaller companies, for example, 498
which successfully develop third-party software for the Windows operating system. We 499
conjecture that this third party supplier-para-community brings vital dynamism to the 500
ecology of the industry for innovation to flourish. As discussed earlier, innovation often 501
sprouts when there are conditions such as the open-source developers whose identity or 502
disposition is antithetical to large organizations such as Microsoft. 503

When the concept of adaptive expertise is brought to the organizational level, it can also 504
be understood through lenses of efficiency, innovation, and social capital. We recognize that 505
there is value in transforming organizations to be less hierarchical and more collaborative— 506
that is to say, for them to be more distributed in terms of control, and more knowledge- 507
oriented in their business goals. At the same time, attempting to form CoPs in organizations 508
is a “lethal mutation” (Collins et al. 2004) of the very concept of CoPs, because the 509
fundamental mechanisms and value systems of the two are different. Both organizations 510
and communities serve different goals and should be complementary rather than integrated. 511

In order to cultivate innovation and ideas, a culture of openness, risk-taking, and 512
experimentation should be encouraged. CoIs should be encouraged within organizations. 513
The former are in fact natural platforms for further interactions with para-communities. 514
There should be intentional attempts to gradually move toward the adaptive organization by 515
heightening dispositional social capital. CoIs in organizations can formalize sharing 516
sessions, during which members relate experiences gained from para-communities and 517
consider how to tap onto each other’s ideas. CoIs can regularly invite para-community 518
leaders to participate in organizational decision making, thereby leading to a cross- 519
fertilization of knowledge and ideas. Space and time for such activities need to be 520
formalized and not treated as a “waste of time” just because they do not contribute directly 521
to the KPIs of an organization. Organizations need to adapt themselves to recognize that 522
person-oriented KPIs ultimately lead to greater productivity. 523

In institutions of higher learning, for example, faculty members are encouraged to 524
constantly engage in dialogue and special interest issues pertaining to research interests and 525
their respective academic disciplines. In this way, faculty members engage with CoIs. 526
Concomitantly, it is deliberate that professors regularly attend conferences, engage in study 527
trips to other research centers and universities in order to network, share knowledge, and gain 528
understanding from others. Such activities represent collaborations with para-communities. In 529
this vision of academia as adaptive organizations, KPIs are not just task-driven (e.g., outputs 530
in terms of research publications), instead an intentional stance to develop professional 531
identities and passion for research and innovation is part of the culture. 532

In the same vein, the KPIs of schools are national and high stakes examinations. These 533
indicators are performance- and efficiency-driven; it is challenging to mediate the tensions 534

between achieving innovations through creativity, while yet maintaining high examination scores. We recognize that there are dispositions developed in students under the efficiency-regime of schooling when they do their level best in achieving and delivering performances based on deadlines (still necessary as dispositions and skills at work).

Such tensions should not hinder attempts to foster student engagement with para-communities which are meaningful to their world view. We argue against schools trying to take over the place of para-communities by artificially setting up within their formal structures the equivalent of such communities. This is because it is our belief that attempts to do so would result in the ecology of the formal-informal dialectic being ruined by the dominance of extrinsic issues such as KPIs. Instead, our stance is for students to be encouraged to continue to engage with these personally-meaningful para-communities—which are already in existence and have their own peer-negotiated cultures—in order that they develop in ways which are more intrinsically motivating. Such para-communities include—but are not limited to—the so-called guilds of MMORPGs such as *World of Warcraft*.

Looking ahead to the next 5 years or so, the present authors will conduct an ongoing review of literature which is intended to inform research to broker the spaces between formal and informal learning. We see such a review as timely, precisely because these spaces are as yet ill-defined and ill-understood. Concurrent with more advanced iterations of the review, we will propose a blueprint for research. We will investigate the extent to which the possibility of school-based CoIs play a part in the development of new media literacies among students. Fostering appropriate linkages and identity transitions between formal and informal milieus, and how these could be made possible, is a priority area of research in the coming years.

References

- Anderson, C. (2006). *The long tail: Why the future of business is selling less of more*. New York, NY: Hyperion.
- Barab, S., & Duffy, T. (2000). From practice fields to communities of practice. In D. Jonassen & S. Land (Eds.), *Theoretical foundations of learning environments*. Mahwah, NJ: Erlbaum.
- Barab, S. A., & Hay, K. E. (2001). Doing science at the elbows of experts: Issues related to the science apprenticeship camp. *Journal of Research in Science Teaching*, 38(1), 70–102.
- Barab, S. A., MaKinster, J. G., & Scheckler, R. (2004). Designing system dualities: Characterizing an online professional development community. In S. A. Barab, R. Kling, & J. Gray (Eds.), *Designing for virtual communities in the service of learning* (pp. 53–90). Cambridge, MA: Cambridge University Press.
- Bielaczyc, K., & Collins, A. (1999). Learning communities in classrooms: A reconceptualization of educational practice. In C. M. Reigeluth (Ed.), *Instructional design theories and models* (vol. II). Mahwah NJ: Erlbaum.
- Bransford, J., Brown, A., & Cocking, R. (Eds.) (1999). *How people learn: Brain, mind, experience, and school*. Washington DC: National Academy Press.
- Cohen, D., & Prusak, L. (2001). *In good company*. Boston, MA: Harvard Business School.
- Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *Journal of the Learning Sciences*, 13(1), 15–42.
- Edelson, D. C. (1997). Realizing authentic science learning through the adaptation of science practice. In B. J. Fraser & K. G. Tobin (Eds.), *International handbook of science education* (pp. 317–331). Dordrecht: Kluwer.
- Edelson, D. C., Gordin, D. N., & Pea, R. D. (1999). Addressing the challenges of inquiry-based learning through technology and curriculum design. *The Journal of the Learning Sciences*, 8, 391–450.
- Edelson, D. C., Pea, R. D., & Gomez, L. (1995). Constructivism in the collaboratory. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design*. Englewood cliffs, NJ: Educational Technology Publications.

Friedman, T. L. (2007). *The world is flat: A brief history of the 21st century*. New York: Picador. 586

Gladwell, M. (2000). *The tipping point: How little things can make a big difference*. Boston: Little, Brown and Company. 587 Q2
588

Hung, D., & Chen, D. - T. (2002). Understanding how thriving Internet quasi-communities work: Distinguishing between learning *about* and learning *to be*. *Educational Technology*, 42(1), 23–27. 589

Hung, D., & Chen, D. - T. (2007). Context-process authenticity in learning: Implications for identity enculturation. *Educational Technology Research & Development*, 55, 147–167. 590
591
592

Hung, D., Chen, D. - T., & Koh, T. S. (2006). The reverse LPP process for nurturing a community of practice. *Educational Media International*, 43(4), 299–314. 593
594

Hung, D., Tan, S. C., Hedberg, J., & Koh, T. S. (2006). A framework for fostering a community of practice: scaffolding learners through an evolving continuum. *British Journal of Educational Technology*, 36(2), 159–176. 595
596
597

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Milton Keynes, UK: Open University Press. 598

Latour, B. (1993). *We have never been modern*. Cambridge, MA: Harvard University Press. 599
600

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press. 601 Q2
602

O'Neill, D. K. (2001). Knowing when you've brought them in: Scientific genre knowledge and communities of practice. *The Journal of the Learning Sciences*, 10(3), 223–264. 603
604

Petraglia, J. (1998). The real world on a short leash: The (mis) application of constructivism to the design of educational technology. *Educational Technology Research & Development*, 46(3), 53–65. 605
606

Popper, K. R. (1979). *Objective knowledge: An evolutionary approach* (revised edition). Oxford University Press: Oxford. 607 Q2
608

Preece, J. (2000). *Online communities: Designing usability, supporting sociability*. England: Wiley. 609

Prensky, M. (2006). *Don't bother me mom—I'm learning!* St. Paul, MN: Paragon House Publishers. 610

Rheingold, H. (1994). A slice of life in my virtual community. In L. M. Harasim (Ed.), *Global networks: Computers and international communication* (pp. 57–80). Cambridge, MA: The MIT Press. 611
612

Scardamalia, M., & Bereiter, C. (2003). Knowledge building. In *Encyclopedia of Education* (pp. 1370–1373, 2nd ed.). New York, USA: Macmillan. 613
614

Schlager, M., & Fusco, J. (2004). Teacher professional development, technology, and communities of practice. In S. A. Barab, R. Kling, & J. Gray (Eds.), *Designing for virtual communities in the service of learning* (pp. 120–153). Cambridge, MA: Cambridge University Press. 615
616
617

Shepard, L. (2000). The role of assessment in a learning culture. *Educational Researcher*, 29(7), 4–14. 618

Squire, K. D. (2004). Sid Meier's Civilization III. *Simulations and gaming*, 35(1), 135–140. 619

Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice*. Boston, MA: Harvard Business Press. 620
621