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Cyber- Discourse
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Extended Abstract

This paper is mainly composed of two sections.

Section (I) provides a review of Carl Bereiter's and Marlene Scardamalia's theories of knowledge, learning and mind in education. Firstly, to examine how they apply Karl Popper's 3-world schema for collaborative knowledge building discourse with a brief evaluation of their ontological, pedagogical, scientific and technological justifications. Secondly, to mention the educational significance of inter-world interactions for cyber-based teaching and learning context for evolutionary growth of human knowledge.

In Section (II), one *power-cohesive* domain in a collaborative knowledge building research community is brought out, apart from the affective and (meta)-cognitive ones, reflected from Bereiter's and Marlene's research works. In particular, by using M. Foucault's concept of 'panopticism', an in-depth *discourse analysis* is carried out to explore how power-relationships among some IT educational staff members in the Faculty of Education at the University of Hong Kong affect their perception of potential impacts of cyber-forum upon the overall research community. Lastly, a conceptual review of 'cyber-based collaborative learning' is offered and further research agendas are implied for enhancing collaborative learning and researching communities in Hong Kong.

Notes:

1. During the time for paper discussion, some qualitative interview data will be displaced for reference.
2. This full colloquium paper is wholeheartedly dedicated to Prof. Carl Bereiter, Prof. Robbie Case, Mr. Eugene Y. C. Ho (Popper's close friend), Sir Karl R. Popper and Prof. Marlene Scardamalia [arranged with surnames in alphabetical order].
3. Special thanks are given to my sincere colleagues at the University of Hong Kong. They are Dr. Carol K. K. Chan, Mr. W. W. Ki, Dr. Nancy W. Y. Law, Dr. Sandy S. C. Li, Prof. F. Marton, Dr. W. Y. Pong, Mr. Felix L. C. Siu, Mr. C. K. Wong, Ms. Suzanne S. S. Wong and Dr. Allan H. K. Yuen [arranged with surnames in alphabetical order]. I deeply appreciate their continuous encouragement and stimulation in several weekly brown-bag seminars on the notion of learning in the Faculty of Education. I owe much to Dr. Carol Chan for helping me clarify my overall argument and correct my faults in the previous drafts of this colloquium paper.
4. I show my greatest gratitude towards those students, academic, administrative and technical staff (especially at the CITE and CMI) for spending their valuable spare or working time on answering my interview questions during this study. Without their valuable interview data, this paper cannot be completed so smoothly.

Section (I)

Introduction

In voluminous research literature [especially some international conference proceedings like Chan et al. (1998); Maurer (1995) in the past decade] on information technology (IT) education, there is often a lack of cognitive or educational psychology theories, accounting for the enhancement of IT in students' learning. Potential changes in students' knowledge building-up process, teachers' pedagogical roles and necessary transformation in classroom culture are *mere dogmas* of some IT proponents without in-depth vindication. The most important of all, basic conceptions of learning and knowledge and their inter-relationships in the IT media are often ignored.

By building up an architecture of computer-supported collaborative knowledge-building discourse through the Computer Supported Intentional Learning Environment (CSILE) project [on-line at <http://csile.oise.on.ca>], Carl Bereiter and Marlene Scardamalia have proposed a new constructivist, connectionist view of mind for some years. The project itself aims to increase the quality of knowledge that students socially construct and help them master *knowledge as an object per se* with a range of problem-solving strategies.

Application of Popper's 3-world theory to knowledge building discourse

By incorporating Karl Popper's 3-world schema [in Popper (1972; 1999); Popper & Eccles (1977)], they articulate an intentional learning theory using a communal database. They contend that students can build up their public knowledge constructively in World 3 (which is composed of all abstract academic theories, scientific hypotheses, conceptual works and so forth), when students socially interact with each other in data-support cyberspace. Besides this World 3, students' learning embedded in individual mental activities is in World 2 (which contains all mental entities) and they are themselves physically involved in World 1 (which is consisted of all physical things). As a means to rationalize human behavior, *conceptual artifacts* can be dynamically constructed from cultural artifacts. In particular, *assertive artifacts*, a subclass of conceptual artifacts, can be ultimately involved through the process of knowledge building. Such artifacts are some salient features of the newly emerged knowledge society, wherein the continual process of *corroboration* of the underlying theories, hypotheses and factual claims constitute the essence of conceptual artifacts in World 3 [Bereiter (1999), Chapter 3; Bereiter; Scardamalia (1996), p.493; Scardamalia; Bereiter; Lamon (1995), pp.206-207].

What are 'conceptual artifacts'?

In Bereiter's (1999) semantic analysis, the adjective 'conceptual' describes discussible ideas, ranging from theories, designs and plans down to abstract concepts whilst the noun 'artifacts' refers to human creations for some purposes or motivation. The essence of such 'conceptual artifacts' is exemplified by several characteristics, namely, historical, descriptive, comparable, evaluative and amendable. They are of multiple uses and become constructive discussion topics, upon which people have different degree of understanding and application. Bereiter [(1999), Chapter 3] provides three tests for identifying conceptual artifacts; *namely, as a tool, as a mean for rationalizing human*

behavior and some of which (i.e. assertive artifacts mentioned above) as assertions with truth-values. To demonstrate, Boolean logic system, A. Einstein's (STR) and (GTR) are good examples of conceptual artifacts whereas poems with ironic tones, novels written on sensitive topics may not be so universally because of no socio-cultural conformity gained after publication.

Importance of conceptual artifacts for knowledge building discourse

The evolutionary nature of the knowledge building community can be captured by its *visibility* in a broad and long-term perspective:

“What is going on at a particular time and place may have little evident fit to the concept of knowledge-building community. We should expect no more from a school. We should not expect to walk through the door and behold something recognizable as a knowledge-building community. What we have a right to expect from a science or scholarly discipline is *progress* in collective knowledge and understanding *over some reasonable time span*.” [Scardamalia; Bereiter; Lamon (1995), p.223; words in italic for emphatic purpose]

To account for the evolutionary growth of human knowledge, Bereiter [(1999), Chapter 3] elaborates his *progressive discourse* by making several commitments. He focuses on conceptual artifacts, rendering improbability as a positive attribute of conceptual artifacts, making commitment to expand factual base, gaining mutual understanding (rather than superficial or pseudo-agreement), making selective criticism (based on knowledge advancement goals) and promoting non-sectorianism. Such commitments play a significant role in collaborative knowledge building discourse.

Bereiter [(1999), Chapter 3] reminds the educators that knowledge building is not only a process, but also *conceptual artifacts* can be generated *as an ultimate product* as well. Such artifacts do not occupy in the individual minds of the students. They are neither materialistic nor visible, but they exist in the real World 3, which is a platform for students' collaborative knowledge discourse.

Cross-world interactions

Bereiter and Scaramalia contend that World 3 is *primary* and is the basis for our hypothetical construction of a World 2 in the individual mind, but not vice versa [Scardamalia; Bereiter; Lamon (1995), p.226]. According to Popper, entities in World 3, to some extent, *causally initiate effects* in World 1 through World 2:

“Euclid wrote down the proof in his famous book The Elements. The World 3 theorem was thus committed to papyrus, so that it causally modified World 1 via the World 2 of the human Euclid. Euclid's beautiful proof is now in every printed book on number theory. But a book is printed with machines. These machines, as well as the books, are physical objects that plainly belong to World 1. Again we have a causal effect that starts from the autonomous part of World 3 and then *causally* affects World 1 via World 2.” [Popper (1999), p.28]

In general, Popper argues:

“World 3 objects have an effect on World 1 only through human intervention, the intervention of their makers; more especially, through being grasped, *which is a World 2 process*, a mental

process, or more precisely, *a process in which World 2 and World 3 interact* [Popper; Eccles (1977), p.47]”

The significance of World 2 lies in its *being an intermediary* between World 3 and World 1, accounting for the causal influence of World 3 upon World 1:

“.....For we have seen that *one kind of interaction between Worlds 2 and 3 (“grasping”)* can be interpreted as a making of World 3 objects and as a matching of them by critical selection; and something similar seems to be true for the visual perception of World 1 objects. This suggests that we should look upon World 2 as active, as productive and critical (making and matching).....” [Popper; Eccles (1977), p.48; words in italic for emphatic purpose].

Based on such 3-world schema, Bereiter and Scardamalia draw its educational implication:

“.....the classroom discourse is orchestrated by the teacher *for the purpose of* producing changes in World 2, the mental states of the students. Leave out World 3 and you either have naïve realism, in which students’ beliefs (World 2) are to be brought into conformity with the true nature of things (World 1), or else you have the relativistic gabfest, in which students ‘share’ thoughts out of their respective Worlds 2, with no basis for comparing or improving them. Leave World 1 out of consideration and you have the verbalism academic discourse is prone to. Leave World 2 out of consideration and you leave out personal meaning and the intuitive wellsprings of progress in World 3.” [Bereiter; Scardamalia (1996), p.494-495.]

Essence of ‘World 3’

World 3 is *not the ultra-World 1* in Platonic sense. Bereiter clarifies that being a Platonic form, truth exists timelessly, and are being discovered and apprehended, but not constructed by human enterprise, as a particular. However, conceptual objects such as conjectures, explanations, proofs and arguments in World 3 are socially constructed by human beings with their individual mental activities in World 2 whilst materialistic matters are involved in World 1 [Bereiter (1999), Chapter 3].

He elaborates further:

“World 3 is the world of artifacts that may be discussed as knowledge theories, factual assertions, problem statements, histories, interpretations, and many other products of human thought. World 3 is not limited to accepted, verified, or important knowledge objects. It can include discredited theories, crank notions, unsolved problems, and new ideas that may or may not gather a following.....[Bereiter (1999), Chapter 7]”

Educational significance of ‘World 3’

He regards formal education as ‘acculturation¹ to World 3’, which means joining the ranks of those who are familiar with, understand, create, and work with the conceptual artifacts of their culture for the whole personality development. In Bereiter’s mind, the core concepts of primary and secondary schooling should be to help students build up a

¹ Notably, Bereiter (1999) cannot draw a sharp line of demarcation between ‘acculturation’ and ‘enculturation’. In ordinary English usage, the former refers to learners’ accommodation into a new environment whereas the latter refers to learners’ assimilation into a familiar one where they were born.

comprehensive and coherent understanding of the socially shared world [Bereiter (1999), Chapter 7]. The social world is the world of knowledge embedded in practice, which is *in-between* World 1 and World 2, implied by his thoughts:

“Popper’s schema must be augmented, however, *by what could be called World 2.5. It is the world of knowledge embedded in practice....this is knowledge that cannot be reduced to World 2, individual minds. But it is not part of World 3, either. Being embedded in practice means, in fact, that knowledge has not been abstracted as objects that can be discussed, compared, hypothetically modified, and so on.*” [Bereiter; Scardamalia (1996), pp. 494-495; word in italic form for emphatic purpose]

There are totally six varieties of personal knowledge abilities, in Bereiter’s notion of ‘enculturation to World 3’ [Bereiter (1999), Chapter 5], transcending the G. Ryle’s constrained dichotomy between declarative and procedural knowledge:

1. *statable knowledge (a narrower sense of declarative knowledge)*: ‘book learning’ , a marginal form of knowledge (i.e. a World 2 counterpart of World 3) often encountered in schools, whose validity and significance can be critically discussed and improved through discussion;
2. *implicit understanding*: part of the mental process, not negating the importance of negotiable knowledge but capable of descending from changes in statable knowledge;
3. *episodic knowledge*: the stock of remembered experiences that can help learners reconstruct partly forgotten principles and lines of thoughts, with more memorable and interpretable episodes in students’ active engagement in discussion;
4. *impressionistic knowledge*: in the form of hunches and feelings, helping students in promising directions when being engaged in creating or improving conceptual artifacts;
5. *skills (containing the subgroup of procedural knowledge)*: a whole constellation of cognitive (e.g. in reading and researching) and social ones (like in argumentation and collaborative problem solving) that learners concurrently master without any single-out items and its possession of cognitive (i.e. practical knowing-how) and sub-cognitive domains (i.e. inevitable change in any skill encountered in daily practice);
6. *regulative knowledge*: all kinds of habits that develop through epistemological domains, norms of conduct and value judgement across and within academic disciplines.

Only do statable knowledge and skills draw the most attention of educators, cognitive scientists and educational psychologists. Notably, Gestalt psychologists contend that the whole person’s competence is greater than the sum of identifiable or not easily distinguishable parts. In view of such contention, Bereiter suggests that the teaching of learning should pay heed to the whole and different kinds (at least the above mentioned six types) of knowledge that account for successful learning outcomes.

For a critical review of Bereiter’s and Scardamalia’s arguments, four types of justification, namely, ontological, pedagogical, scientific and technological, are sketched, coupled with some brief comments.

Ontological justification

With the grounding support of the Popper's 3-world ontological framework, Bereiter and Scardamalia lay down two main arguments, accounting for:

- *the malfunctioning of the current schooling systems*: schooling often stresses individual mental activities like rote learning in World 2, undermining or wrongly confuses them with the socially public knowledge in World 3 [Bereiter (1999), Chapter 1; Bereiter; Scardamalia (1996), p.510]
- *a faulty folk psychological view of mind*: folk psychologists stress World 2 in which knowledge is poured into students' individual minds, blurring the distinction between representations in both World 1 and in World 3 [Bereiter; Scardamalia (1995), p.495]

To some extent, Bereiter and Scardamalia make responses to some of his critics:

- *accepting postmodernist critiques against absolute truth*: scientific is not a matter of progress towards truth, but a matter of improving existing knowledge since scientific theories merely represent different ways of perceiving, defining and organizing knowledge of life experiences. In the CSILE project, students have progressive discourse: gaining mutual advances in understanding, framing research questions, conjecturing scientific hypotheses with vigorous corroboration, expanding the basis for discussion and remaining open to tentatively disagreed claims made by others [Bereiter; Scardamalia; Cassells, Hewitt (1997)]
- *dismissing some hypothetical cases against World 3* (in which all the habitants of World 1 died or their working memory capacity were reduced by half): conceptual artifacts would be inaccessible and ungraspable despite their continual existence [Bereiter (1999), Chapter 3]
- *drawing a new conceptual distinction against the charge in linguistic or semiotics*: the charge is that linguistic or semantic abstractions like event-types in nouns or noun phrases do not necessarily have independent existence, beyond descriptive and explanatory constructions in everyday speech. Bereiter borrows directly from Philip Agre's distinction between 'objective' and 'deictic' concepts. The former notion refers to objects, independent of particular life situations, including all concrete artifacts whilst the latter notion has context-, person- and place-dependent meanings. As a result, the charge only points to the latter but not the former. And 'objective' concepts cannot be reduced to 'deictic' ones though they are derived from 'deictic' ones which is primary in nature [Bereiter (1999), Chapter 3]
- *potential misuses / misrepresentations of knowledge not necessarily related to treating knowledge as autonomous mind-independent objects in World 3*: following the critics' path such as keeping knowledge inseparable from the contexts of pragmatic discourse and the constituted actions may also lead to its misuses or misrepresentation. In fact, progressive discourse, with key commitments, enhances continual corroboration of hypotheses, improves and modifies artificial, fallible textbook knowledge. Not only as tools, but also conceptual artifacts can make assertions with high degree of testability and become objects of human inquiry [Bereiter (1999), Chapter 3]

Pedagogical justification

Bereiter and Scardamalia opt for restructuring the classroom by arguing that the actual conditions of schooling *inhibit* efforts at students' genuine understanding of the conceptions of learning and knowledge-building. Learning activities and schoolwork production have been often misperceived as ultimate learning goals in schooling whereas knowledge building has been wrongly treated as *educational by-products* [Scardamalia; Bereiter; Lamon (1995), p.201]. Seven dimensions of schooling can illustrate such inhibition [Scardamalia; Bereiter (1994), pp.267-268 & (1996), pp.151-154]:

- a. *product-oriented education*: schooling is so task-oriented and time-constrained that valuable time for digesting new knowledge and gaining thorough understanding is greatly chunked or truncated. Education-as-a-process can never be sufficiently enjoyed by schooling children due to trimming away meaningful activities;
- b. *unintelligible school texts*: over-simplified school texts require short-term memory rather than long-term understanding. Excessive open exam pressure may aggravate the situation. Attenuated school texts provides superficial theoretical explanations and act as obstacles for deep understanding in some circumstances;
- c. *limited chance for reflection*: classroom discourse with constrained teacher-student interactions often emphasis 'copy-paste' format or knowledge-absorption tactics which severely limit students' exposure for long-term processing of information, their re-conceptualization of learnt concepts and re-structuring their cognitive structure;
- d. *reproduction of knowledge*: rote learning without sufficient understanding of lessons is often found in classroom discourse with a heavy stress on reproducing authoritative texts and reducing time for carrying out their multi-faceted interpretations;
- e. *overloaded learning*: students and teachers are often assigned with plenty of tasks in a limited classroom time. They do not have time for understanding the texts and reflecting the educational values embedded in lesson activities;
- f. *unrealistic knowledge*: some compartmentalized classroom knowledge is so abstract that it cannot be easily captured by students as it is completely detached from their experienced life contexts;
- g. *low rates of learning success*: schooling systems sometimes play selective rather than educating functions. Elite-based school curricula do not cater for low-achievers and thereby inhibit their intellectual growth. Increasing learning frustration and low survival rates of elevating to higher levels of schooling are common symptoms of a bottleneck schooling system.

Very importantly, such symptoms also exemplify the malfunctioning of the current educational system of Hong Kong [Biggs (1996)].

Scientific justification

Bereiter observes that some tenets of constructivist, situational and socio-cultural theories rest on some *unexamined assumption* about learning, originated from folk psychology. Such assumption refers to the deeply rooted metaphors: 'mind-as-container' or 'mind-in-a-filing-cabinet'. People are more comfortable with and get used to such metaphor in two broad aspects: (a). knowledge conceived of as specifiable mental objects like discrete facts, beliefs, ideas or intentions; (b). mental abilities defined in terms of doing

specifiable things with related specific mental objects [Bereiter; Scardamalia (1996), p. 487].

On evaluation, there are many learning things that cannot be closely fitted with such metaphor. For instance, place learning, number sense, linguistic creativity cannot be sufficiently accounted for using the metaphors. Bereiter introduced a new connectionist metaphor of 'mind as pattern recognizer and respondent' [Bereiter (1991)]. Instead of arguing that related patterns or ways of recognizing such patterns being involved into the mind, he contended that the mind *acquires suitable abilities and dispositions to recognize and responds* to some patterns in different specifiable ways [Bereiter & Scardamalia (1996), pp.361-364; italicized words for emphatic purpose].

Beyond Bloom's taxonomy, Bereiter and Scardamalia (1998) provide a provisional scheme, composed of levels of working with knowledge construction. Levels are of objectification nature, stepwisely transforming knowledge in individual mental states into public knowledge as *independent abstract objects per se*. There are totally 7 levels, progressively elevating from one to another for collaborative knowledge building discourse.

Level 0: knowledge as equivalent to "the ways things are": schooling children cannot distinguish thoughts about things from the ways things are and they often have personal beliefs which are not easily recognized to be false

Level 1: knowledge as individualized mental states: they can realize inter-personal knowing disparities

Level 2: knowledge as itemizable mental content: they can relate learning topics they individually know about it

Level 3: knowledge as socially representable: they can use others' cognitive bases to express, represent, share and interpret learning topics

Level 4: knowledge as viewable from different perspectives: they can view knowledge in others' eyes

Level 5: knowledge as personal artifacts: they can view themselves as knowledge builders when embedded in social practice

Level 6: knowledge as improvable personal artifacts: they can understand the strength and limitations of learnt theories and the improvable contexts when being engaged in inter-personal discussion

Level 7: knowledge as semi-autonomous artifacts: they realize that knowledge can have its autonomous existence with many-faceted interpretation

It should be noted that individual learning (pseudo-knowledge) at levels 1-6 are located in World 2 whilst public knowledge at level 7 is located in World 3 (precisely speaking, in World 2.5!)

Based on empirical classroom observational and interview data, the CSILE project can provide some evidence of some grade 5-6 schooling children's attainments of levels 4-6 where level 7 refers to cognitive characteristics of mature academic scholars and scientists.

Technological justification

There are some drastic transformations in current schooling system, under the tremendous impacts of information technology in global dimension. To anticipate such changes, Bereiter expresses his standpoints on the *evolutionary* roles of IT:

“The rise of the Internet makes dramatic a trend that has been going on for well over a century. It is the school’s loss of monopoly over knowledge transmission. Of course, schools never did have a monopoly over knowledge of knowledge transmission, and so we need to clarify what that limited monopoly has amounted to.....Modern societies are full of organizations that store, process, and disseminate academic knowledge. Schools ought not to be clinging to the illusion that they are the whole game. They ought to be positioning themselves in such a way as to make use of other societal resources. Like other organizations that are ‘reinventing’ themselves, they ought to identify what they can do uniquely well and concentrate on elevating that function.” [Bereiter (1999), Chapter 7; words in italic form for emphatic purpose]

In the CSILE project, there are two models for grade 5-6 students in two experimental classrooms. In the independent research model, those students individually frame research questions, attempt to answer them by investigation and report their learning process whilst in the collaborative-building model, they work together, plan, do investigation, assign tasks and allocate duties and comment on individual partner contribution. Qualitative data analysis reveals functional differences between the two models. The independent model (which can be implemented using non-networked software) enhances more writing and superior gains in vocabulary, probably due to an increase in use of external information sources. The collaborative model facilitates more exploratory and cooperative uses of communal database, leading to high levels of knowledge building discourse. [Bereiter; Scardamalia (1992)]

Meantime, contributions of the CSILE project to teacher education can be summarized as follows:

“We are looking for ways that allow the teacher’s domain-specific knowledge and pedagogical knowledge to contribute, but that are not restricted by the teacher’s knowledge. This seems to be essential for any approach that will look across a wide range of classrooms and knowledge domains.” [Scardamalia; Bereiter; Lamon (1995), p.224]

Underlying assumptions

- Bereiter implicitly presupposes some *post-positivist* research paradigm, when clarifying the non-Platonic nature of World 3 by saying:

“Whether Platonic mysticism carried as far as Newton and beyond is an interesting question, but what is more important is nothing about World 3. It is a thoroughly modern and, I would say, *post-positivist concept* [Bereiter (1999), Chapter 3; words in italic form for emphatic purpose].”

- Notably, Bereiter is paying close attention to anti-foundationalist, post-positivist and postmodernist critiques of Popper’s 3-world theory, he summarizes the critiques into several points:

“There are no isolated facts. All supposed facts have theoretical presuppositions and thus are not fundamentally different from theoretical propositions. Theories do not exist in isolation either, but are embedded in paradigms. And paradigms are generally not fully articulated. They are more like traditions than they are like super-theories. What we call knowledge is merely belief that has gained acceptance in some group. Thus knowledge cannot be separated from the people who uphold it. There is no value-free knowledge. The beliefs that a group upholds as knowledge or truth are ones that subservise its interests [Bereiter (1999), Chapter 3].”

- Bereiter endeavors to put forth a *connectionist* view of mind and knowledge:

“If we take a connectionist view of mind, however, then the relation of the student’s World 2 to Worlds 1 and 3 becomes more complex and the difference between 1 and 3 takes on more significance. *The student’s mind is seen as adapting to patterns, both as these are experienced in the physical world and in social practices.* That kind of adaptation to pattern, however, characterizes the learning of social animals as well as human beings. It is what we described earlier as “learning one’s way around” in physical and social environments.” [Bereiter; Scardamalia (1996), p.495; words in italic form for emphatic purpose]

Inner structure of various justifications

In fact, Poppers’ 3-world ontology² establishes a *grounding support* for Bereiter’s and Scardamalia’s pedagogical and scientific argumentation:

- Implications of a theory of mind and knowledge in teacher education:

“The effective teacher or instructional designer,must be able to move flexibly between a *World 3 view*, in which the class’s knowledge is regarded, as a public, objective entity that the teacher must help develop optimally, and a *world 2 view*, in which teacher works with hypothetical mental structures attributed to individual students....When working *at a World 2 level*, the educator may be trying to get inside the child’s head and to see evolution the way the

² However, Popper’s 3-world schema has some loopholes, *ontologically speaking*.

- *circularity of Popper’s schema due to inter-dependence of the three Worlds*: their existence does not extend beyond mere assertions about cross-world interactions; [Corri (1997), pp.92-94; Currie et al.(1985), pp. 113-114]
- *the vague true-false and objective-subjective boundaries*: no additional criteria or ultimate world for identifying truths from falsehood, where both are asserted to exist in World 3 and thereby threatening the objectivity of knowledge [Currie et al.(1985), pp. 5-7] and similar ones for distinguishing between the subjectivity of individual mind in World 2 and the objectivity of public knowledge beyond the mind in World 3 [Corri (1997), pp.92-93]
- *ontological extravagance of World 3*: its entities can be interpreted as interactions of the corresponding counterparts in both World 1 and World 2 and there is no *independent ontological ground* to argue for the World 3 entities, without a reference to the counterparts in the other two worlds [Currie et al. (1985), p. 114 & p.121].

Some ontological critics may urge Bereiter and Scardamalia to provide *non-circular* explanations for learning and knowledge building to occur through mere inter-world interactions, beyond Popper’s 3-World schema. Yet it is unnecessary for them as *empirical* educational researchers to make an ontological defense.

child see it. *When working at a World 3 level*, the teacher may ask whether the prevailing quasi-Lamarckian conception is impeding progress of the knowledge-building discourse or perhaps helping it to move ahead to a fuller understanding of adaptation.” [Scardamalia; Bereiter; Lamon (1995), pp.227-228; words in italic for emphatic purpose]

- Misconceptions often held by educators, teachers, cognitive scientists and educational psychologists:

“Standard-brand cognitive science is helpful in working *at the World 2 level*, but it is essentially mute *with respect to World 3*. This makes cognitively oriented educators susceptible to a very serious confusion between (a) the way knowledge is organized in the mind of the child (*World 2*) and (b) the child’s knowledge of the way knowledge is organized in a publicly shared domain (*World 3*.” [Scardamalia; Bereiter; Lamon (1995), p.228]

Bereiter and Scardamalia seem to be satisfied with this framework, because of no other better alternatives:

“.....Popper’s three-worlds schema is not exactly a precision instrument, but compared to what folk theory has to provide, it gives a significant boost to analytic powers....” [Bereiter; Scardamalia (1996, p.494].

On the whole, pedagogical and scientific arguments rest on such ontological justification whilst technological justification (i.e. the existence of virtual learning space in World 2.5) provides *a tenable foundation* for their ontological justification. So far so good!

A sophisticated constructivist viewpoint

In phenomenographic theorists’ viewpoints [Marton; Booth (1997), Chapter 1, pp.1-13], a remarkable difference between an individual constructivists (like J. Piaget) and a social constructivist [like L. S. Vygotsky (1978)] lies in their value orientations on *the interactions* between ‘the inner self’ and ‘the outer world’. On one hand, an individual constructivist treats learning as a continual process of constructing knowledge when the inner self interacts with the external environment by means of the accommodation-assimilation adaptative mechanisms. On the other hand, a social constructivist regards learning as *an internalization* of the external environment upon individual selves within the zone of proximal development.

Bereiter (1994) seems to take a pragmatic view, arguing that both individual and social constructivists’ viewpoints are *complementary*. Each is *equally applicable* in some cases, depending on the researcher’s assumed inside-out and outside-in interactions between a learner and the external world. However, based on the above 7-level neo-Bloom taxonomy, Bereiter and Scardamalia (1998) seem to take an individual constructivist’s ‘inside-out’ viewpoint for granted.

Later Bereiter (1999) seems to combine both ‘inside-out’ and ‘outside-in’ processes of collaborative knowledge building discourse when theorizing how learners build up explicit and tacit knowledge throughout sub-processes of socialization, externalization, combination and internalization [Bereiter (1999), Chapter 6; see the above footnote 1].

On evaluation, his sophisticated argument for knowledge building discourse in World 3 through cross-world interactions is a little bit ambiguous³.

For instance, *the shift* from individual learning in World 2 to ‘objectification’ of knowledge through socialization in World 3 requires more theoretical explanations for the *seemingly simultaneous* processes of internalization and externalization. There is a still *big cognitive jump* from level 6 to level 7, in Bereiter’s and Scardamalia’s neo-Bloom taxonomy. At level 7, it is still *mysterious how* individual knowledge-holders are ‘transcended’ into public knowledge beyond the mind, which cannot be analyzable into smaller individual components, unlike the analytical tradition of epistemology [Pollock; Cruz (1999)]. To sum up, his constructivist⁴ approach cannot completely resolve the learner’s paradox, previously formulated by Bereiter (1985).

Section (II)

Believed by the author, ‘conceptual artifacts’, in Bereiter’s (1999) sense, can be collaboratively constructed for the knowledge building cyber-discourse in a researching community, depending on *three domains*⁵. They are *affective, (meta)-cognitive and power-cohesive domains* in a research community, sketched in the following figure 1. In the affective domain, a member has an intrinsic motivation to do a task in serving the community for the sake of holding some commonly shared commitments, values and building mutual trust. A member has an extrinsic motivation to do so for the sake of her or his formal job requirements. A member has an achieving motivation to do so for the sake of building some sense of achievement with an intrinsic motivation or some positive personal value appreciation of that task. To illustrate, there is no formal requirement for a research assistant to do some voluntary job, apart from her or his assigned research project(s) [with achieving or extrinsic motivation]. If he or she does so, he or she is either intrinsically motivated or with achieving motivation.

Such *affective* and (meta-) cognitive domains can have other enriched empirical contents in other knowledge building organizations. For example, involved persons like parents, students, teachers and instructional tutors in collaborative IT-media knowledge building discourse at primary and secondary levels of schooling [e.g. Crook (1998); Fishman (1999); Katz & Lesgold (1993); Lajoie (1993); Mayer; Schustack & Blanton (1999); Scott & Hannafin (2000); Silverman (1998); Teasley & Roschelle (1993), Watson, Blakeley & Abbott (1998); Winn & Jackson (1999)].

³Owing to short researching time and word limit in this paper, Bereiter’s argument is misinterpreted or over-simplified.

⁴ Frankly speaking, in Bereiter’s (1999) framework, it is still uncertain whether the ‘external world’ is World 1 or World 3 or both. In each possible case, he still owes us a non-circular explanation of the developmental process of how learning initiated from individual mind in World 2 coming to public knowledge construction beyond the mind in World 3.

⁵ The 3 dimensions are *interdependent* in some situations. Some incidents exemplify that the affective domain may affect partly power-cohesive dimension. For instance, constrained by some rules under some power influence, some weak members (even with a strong intrinsic motivation) hesitate to air their genuine opinions when joining a cyber-forum, in view of other powerful ones. See the following interview data.

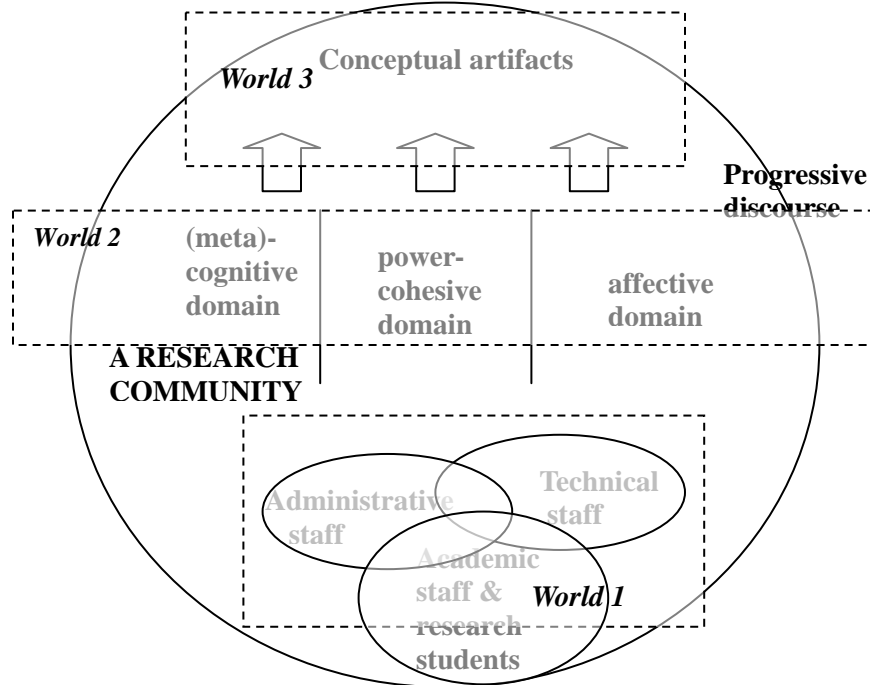


Figure 1: Three domains for a collaborative knowledge building research community

Collaborative Internet Discourse

At tertiary level, one internet discourse is the virtual student-centered ‘learning space’ [at <http://www.educ.hku.hk/student/index.htm>], currently offered in the B.Ed. (full-time and part-time), M. Ed. (part-time) and P. C. Ed. (full-time) courses by the Dept. of Education at the University of Hong Kong in the school year 1999-2000. In informal semi-structured interviewing, 13 student and 5 teacher users of such ‘learning space’ expressed their innovative teaching and learning experiences:

- finding a new cyber dimension to deepen their mutual understanding or disagreements
- improving lecturer-student / tutor-tutee relationships
- re-conceptualizing their distinctive roles and the underlying teaching and learning process before and after the lectures or tutorials

Some qualitative data patterns are summarized as follows:

Table 1: Qualitative interview evaluation of ‘learning space’

<p>5 Teacher-users: 2 M.Ed. lecturers, 2 P.C. Ed. lecturers / tutors and 1 B. Ed. tutor</p>	<p>Some examples of refreshing teaching and tutoring experiences</p> <p><i>Reinforcement role:</i> 1. “Before I think lecturing is boring for me and my tutees. Now I can enrich my lecture or tutorials by sharing more with my students in the learning space. I am now more motivated to <i>learn how to teach and tutor</i> after reviewing students’</p>
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	<p>questions and feedback...Despite increasing workloads, I find what is meant by genuine teaching and learning.”</p> <p>2. “The pictures on the learning space help me recognize my students’ faces and <i>identify who are deep or surface learners</i>. Before, I easily forget them and I can also understand <i>how much and to what extent they understand</i> when they actively making responses to the ideas or questions, firstly initiated by one student...”</p> <p><i>Repetitive role:</i></p> <p>1. “I can see how my tutees have fruitful repetitive learning when put educational theories into practice. They seem to memorize my lecture notes or speech as I find that they use many key words and thoughts repetitively in the learning space...Their understanding on some topics seemed to be deepened but I don’t know to what extent or whether the learning space helps them.”</p> <p><i>Complementary role:</i></p> <p>1. “As a chief course coordinator, I think tutors should learn how to ‘scaffold’ tutees’ thinking process by avoiding direct answers to their questions and suitably challenging their misconceptions.....It is a new tutoring know-how!”</p> <p>2. “At the first beginning, I don’t believe any impacts of learning space on the art of my teaching. ...Throughout the semester, I find I know more about my limitations in theoretical and pragmatic aspects. By rethinking teaching contents during the answering students’ questions process, I can construct new teaching knowledge....how to make them more understandable, how to get information about their inner thought....”</p>
<p>13 student-users: 5 B. Ed. (full-time), 1 B. Ed. (part-time), 4 P.C. Ed. (full-time) and 3 M.Ed.(part-time) students</p>	<p>Some examples of innovative learning experiences</p> <p><i>Reinforcement role:</i></p> <p>1. “My tutor helped me <i>consolidate</i> some theoretical framework by giving more practical applications.....”</p> <p>2. “I realize my tutor make prompt responses to the questions my classmates raised in the learning space. Sometimes, he even helped us to <i>understand how and why such questions arise</i>.”</p> <p><i>Repetitive role:</i></p> <p>1. “I can see many previously learnt ideas, theories, repetitively re-appeared in the brainstorming, raising questions and feedback sessions of the learning space <i>with creation of some new things...interesting and challenging</i>.”</p> <p><i>Complementary role:</i></p> <p>1. “I increasingly like my tutors. Writing essays and doing project work may not wholly reflect how much I understand the studying topics. Learning space questions, feedback make us have a sense of belonging....more new aspects of <i>leading new discussion</i>, based on preliminary theories...”</p> <p>2. “I know my tutor work harder in lesson preview and review of tutorials. In the learning space, I observe that he constantly adds links to resourceful internet website addresses, reference materials and make his proper feedback to our questions. Being the same lecturer, he</p>

	knows more about us...how much we understand or in what way we don't understand some topics covered in the learning space..."
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Significance of the power-cohesive domain

Based on educational psychologists' standpoints, there is still a *big why* (in non-cognitive sense) some learn better (qualitatively) and more (in quantitatively) than others in some socio-cultural settings.

For instance, on evaluation of the CSILE project, it is observable that collaborative group notes may not necessarily generate and synthesis knowledge with consensus in World 3. Nevertheless, the summary note can *reflect the group's progress* than its members' beliefs and individual cognitive differences. [Scardamalia; Bereiter; Lamon (1995), p.225]

Meantime, in a knowledge-building networks extended from individual schools to cross-school projects or to an enlarged community in which volunteer specialists (mainly in science) are engaged for professional consultation, there are some socio-cultural discrepancies [Scardamalia; Bereiter (1996)] in the CSILE project:

- *Non-scalable*: the network serves a limited number of classrooms, not fitting well with insufficient system-wide expert resources
- *Unsustainable*: experts' losing patience to answer burdensome, repetitive questions or student learners' losing patience to wait for their answers due to their big cognitive differences on subject areas or asynchronous communication respectively
- *Violation of the basic principles of classroom knowledge building discourse*: student learners may rely wholly upon experts' knowledge, instead of their own social construction

Constrained by different power relations, it is understandable to find disparities in the nature of collaborative discourses: the art of school knowledge building is completely different from that of the expertise science communities. So there comes an urgent need to scrutinize the power-cohesive domain in the above figure 1.

In the *power-cohesive* dimension, power and knowledge are intertwined together in a knowledge-building community. Unequal power relationships among various group members can influence *how, when and why* users construct their knowledge individually and collaboratively in cyber-campus. Message-senders, respondents and recipients reflect the complexities of such power relationships: value conflicts, judgment, mediation and sharing. Powerful cyber-users may consciously or implicitly use the cyberspace to extend their power control over or monitor weaker ones, for the purposes of fulfilling their goals embedded in commonly shared working rationales, value beliefs or their own value systems. The incentives of the former may be positively appreciated or negatively condemned by the latter after detection.

Notably, M. Foucault's (1979, p.195) concept of 'panopticism' suffices to illuminate these dialectical power relationships:

“The panopticon⁶ may even provide an apparatus for supervising its own mechanisms. In this central tower the director may spy on all the employees that he has under his orders.....he will be able to judge them continuously, alter their behavior, impose upon them the methods he thinks best; and it will even be possible to observe the director himself. An inspector arriving unexpectedly at the centre of the panopticon will be able to judge at a glance, without anything being concealed from him, how the entire establishment is functioning ”Foucault [(1979), p. 204]

Another semi-structured interview endeavors to explore in depth *how* inter- and inter-group power relationships among collaborative workers (across and within research units in the Faculty of Education at the University of Hong Kong) affect their perceptions of the functioning and feasible roles of cyber-space in the collaborative knowledge building discourse⁷.

Interview design, scale and the underlying research paradigm

The author adopts a postmodernist research paradigm, under which semi-structured interviewing is regarded as a form of *linguistic discourse*, in which the meanings of open-ended interview questions and answers are contingently context-specific, totally depending on the interactions between the interviewer and the respondents at specific times. *Inter-subjectivity* in the interpretations of raw interview data is infeasible, as there are many-facets of the underlying reality, interpreted by the interviewer or different interviewer(s) for specific researching deliberate purpose(s) or unconscious intentions [Scheurich (1997), pp. 62-63]. Its communicative validity is considered, based on the legitimacy of the interviewer-interviewee relationships on some focused items. The interpretative authority lies in their mutual negotiation and clarification during the interviewing time [Kvale (1996), pp.244-248].

Owing to rushed researching time, limited human manpower and staff’s busy working time, a convenient sample of totally 18 persons⁸ was chosen dated from 1 April to 12 May, 2000. The interviewing time was short (8-15 minutes on average for each person). Detailed qualitative information is summarized in the following table 2.

⁶ In Jeremy Bentham’s artistic design for the surveillance of inmates in the French penitentiary, the ‘panopticon’ is a circular building with security guards in the middle and the prisoners’ cells arranged around the periphery. The guards in a powerful position inspect the prisoners without being seen themselves. Such unverifiable inspection makes it the more powerful. With uncertainty about when and whether he lies in the field of ‘public’ visibility, a prisoner seems to govern his own behavior and becomes his own guardian. [Foucault (1979), pp.202-203]

⁷ Owing to limited researching time of the author and tight daily working schedule of the interviewees, other researching methods like questionnaire survey and project meeting observation could not be simultaneously utilized to reflect ‘multi-faceted’ realities of the phenomenon under investigation.

⁸ For privacy reasons, their names and working positions will not be displaced in the paper. Requested by some interviewees, the interviewer cannot release their real names and detailed interview data, related to their working positions, research projects or other personal information.

Table 2: A list of 18 interviewees working in various researching units or with their own research projects

Types of Interviewees	Researching units they have been serving or projects they have been joining
4 technical staff members	<i>Researching units:</i> (a). CITE (Centre for Information Technology in School and Teacher Education) (b). CMI Support Centre (For Teachers Using Chinese As The Medium of Instruction) <i>Research projects:</i> (a). Dragonwise projects on Computer Assisted Chinese Language Education (b). ITN (Interactive Teachers Network) SITES (Second International Information Technology in Education Study) (c).SLITS (Self-directed Learning with Information Technology Scheme) (d). Worldmaker
5 administrative (major in clerical , coordination and secretarial matters) staff member	
9 academic (major in teaching, undergoing researching projects) staff members	

Direction of interview questions

The direction of the semi-structured interview question focused on the power relationships among academic, administrative and technical staff in the research units, related to IT education of the Faculty of Education at the University of Hong Kong. They were led to answer open-ended questions about the nature of their major works, changes in their conceptions of IT education, their working rationale during the working period and value-conflict / -difference resolution situations in daily meetings or collaborative works. Lastly, they were brainstorming about the foreseen advantages and demerits of establishing a cyber-forum, which is a platform for airing their opinions about some educational issues or resourceful information (provided on the forum from time to time).

Precautions when conducting interview

In order to avoid unnatural responses, the interviewees' verbal ones were fully reported by hand without using a tape-recorder. In-depth probing was used throughout the interviewing time. The interviewer had deliberate intentions of uncovering how their power inter-relationships and working positions shape up their own opinions about the possible roles of the cyber-forum. Assessed data included the interviewees' verbal answers, their feelings, facial expressions and insightful questions. Unambiguous questions and answers needed to be clarified and re-interpreted during the interviewer-interviewee communication processes until mutual agreements were reached. Sensitive topics about their private information were avoided.

Interview data interpretation⁹

Interview data illuminates different degree of tension forces between 'public' and 'private' spaces on the internet discourse when asking for their daily roles, value confrontation in routine meetings and the feasibility of establishing a cyber-forum for

⁹ During the paper presentation at the CITE colloquium, the author will show some transcripts of interview excerpts for elaboration.

building up a collaborative researching community. Different people in various working units / at functioning levels have their own distinctive value beliefs in their private spaces whilst they share some common core values in IT education in the 'public spaces'.

'Private space' on the cyber-discourse refers to each individual's capacity to express opinions, hold value-beliefs and form value-judgement, influenced by her or his academic and socio-cultural background, linguistic, social and technical skills. It is believable that cyber-forum can serve as a mediator to flourish the expansion of the 'public space' or increasing the degree of 'immersion' of 'private space' into 'public space', despite increasing pluralistic viewpoints found in 'private space'. Such progressive discourse accounts for the evolutionary growth of a knowledge-building research community.

There are generally three kinds of power discourses possessed by them namely at academic, administrative and technical levels. They are not so necessarily mutually exclusive that some staff share more than one discourse¹⁰. The majority of the interviewees were inclined to think that a cyber-forum is not the only means¹¹ of effective communication. Despite disparities in its particular functions, their common value beliefs in ICT education are its potential positive impacts on students' learning and necessary transformation in classroom pedagogy. These can be confirmed by their certain responses and friendly facial expressions. In general, academic staff used lots of 'academic jargons' to express their educational missions, commitments and expectations. Administrative and technical staff members had less rich description in their educational rationales and their

¹⁰ In this paper, 'discourse' [e.g. Austin (1997), p.153] refers to a dynamic process of sharing and talking ideas in order to resolve value conflicts in social groups with different value-beliefs or working rationales. The cyber-space, believed by the author, can act as a mediator in letting participants gain mutual understanding by looking through others' eyes and even reach consensus ('progressive' discourse) or at least knowing *in what perspectives they do not gain consensus* or reach disagreement ('regressive' discourse). Such adjectives 'progressive' and 'regressive' are relative to each other. In actual human communication, such process of conflict mediation is so dynamic that the degree of reaching agreement or not varies from time to time or case to case and the number of issues being discussed will be increasing onwards. On the whole, uncertainties and complexities of human discourse are involved, depending on the unevenly distributed power relationships cross- / within-group members. In current educational reforms, 'outside-in' and 'inside-out' collaboration, in Fullan's (1999) sense, require such kind of discourse, not necessarily in cyber-platform. One of the objectives of this paper is to find out possible directions for the emergence of 'progressive' discourse in the suggested cyber-space.

¹¹ The interface for collaborative knowledge-building discourse *is not necessarily cyber in nature*. In fact, since the school year 1999-2000, the Research Students Committee (RSC) has organized (bi-) monthly Saturday meets to let research students have in-person collaborative discussion on some concurrent themes like research methodology. Most presenters and the floor participants have succeeded to re-conceptualize the notions of research methodology and gain thorough understanding of the research method implementation problems in their own researching contexts. Similarly, under the influence of forthcoming merging of the two depts. in the Faculty, an in-person colloquium of extending a research community will be organized at the Postgraduates' Annual Conference on May 26-27, 2000. The community's future organizational structure (i.e. complexities and uncertainties after their merging), socio-economic (e.g. limited research fund-raising means) and socio-cultural conditions (e.g. impacts of research assessment exercises upon school culture) will be severely discussed under the leadership of a collaborative team of teaching staff and research students. It is believable that fruitful communication is easily facilitated at the conference.

practical daily works are less rationale-based. In contrast, academic and researching staff often use high-sounding educational rationale to back up their research projects.

On the whole, changes have been found in their conceptions of IT education throughout the working period. They have gained genuine understanding of the advantages and limitations of various IT educational facilities in school environment or research laboratories, depending on their own researching or working environment.

Most of them thought that different functioning purposes require different means of interfaces for human communication. In comparison, in-person communication (especially in meetings and leisure mealtime) is the most effective. Some thought that it is time-consuming, depending on their own time-evaluation criteria. The e-mail or web-based communication mode can provide resourceful information but cannot easily accommodate complexities (e.g. abrupt and subtle changes in discussion topics, content and hidden agendas) in human communication. Most academic staff questioned whether mere cyber-space can provide 'scaffolding' effects on guiding visitors' construction of in-depth communication, discussion for effectiveness and efficiency purposes and even expressed uncertainties about the new 'knowledge' constructed through collaboration in affective and cognitive domains.

For the value confrontation, technical staff agreed that technical design is often *subordinate* to the educational objectives of academic staff. They need to make appropriate adjustment to fulfil such objectives. An impasse is rarely involved. Administrative staff aims to make efficient arrangement for project meetings and necessary co-ordination between academic and technical staff. They contended that e-mails are the most effective for informing meeting participants. Resourceful information on the cyber-forum can achieve its informative purposes. Academic staff members were inclined to think that different viewpoints are not necessarily conflicting and so fruitful that a complete 'picture' of collaboration is illuminated. Power-cohesive forces exemplify the uncertain, chaotic nature of inter- and intra-group collaborative discourse:

"We all face time, human manpower and financial constraints all the time. The final destination is clear but any strategies are varying during the 'in-between' process. This is just like to climb up to the top of a mountain. Facing limited food, water and energy constraints, a group of climbers need to have tactful ways to breakthrough any thorny matters. Their paths ahead are mostly uncertain though they know the fixed ultimate destination. Every member can air her or his own opinions. Group leader(s) need to consider them. Sometimes consensus is not easily reached. Yet all group members share some common value-beliefs, despite holding individual viewpoints....."
[an exempt from a focused interview with an academic senior staff member]

In general, technical staff required more 'private' space, implied from their passive answering format and short answering time. They hesitated to give their real names to air opinions and let their 'bosses' know their disagreement and realize their complaints in the cyber-forum and are willing to see others (rather than themselves) to make responses. On the contrary, academic staff would like to use their real names to express their deep concerns and standpoints when reacting to some educational issues, possibly raised in the cyber-forum. This is due to uneven distribution of power relationships among them.

Some senior academic staff members are responsible for recruiting, employing and renewing the working contracts of most administrative and technical ones within or across various researching units in the faculty. The majority of all interviewees tended to think that using others' names (or cyber-identity) to express opinions in the cyber-forum is immoral, unavoidable and thereby unsecured. Therefore, human identity and harmonious mutual relationships may not be easily preserved in the cyber-space. In some extreme cases, mutual trust¹² among colleagues may be threatened.

In short, most technical staff opted for more 'private' space. The majority of academic staff longed for more 'public' space and administrative staff had a strong preference for more negotiable 'public' space for resolving time clash and other value conflicts among the academic and technical staff. Hence, their power relationships *metaphorically* act like those between prisoners and inspectors in a 'panopticon'. Technical staff feared being observed or inspected in the 'public' virtual space. Some senior staff liked to gain more chances to realize their educational aspirations when the 'public space' is established or extended. Administrative staff wanted to increase co-ordination efficiency by playing the role of power-mediators.

Degree of vindication for the concept of 'panopticism'

In spite of describing some properties of power relationships among the interviewees, piecemeal and qualitative 'thin' interview data within a narrow researching period (about 1 month) does not suffice to illuminate the full concept of 'panopticism'. For example, the regular reinforcement of inter-personal / -group power in a *circular* process [Foucault (1979), p.224] and its humanitarian role of immersing some group members in a field of total visibility when collaborative discourse can prevent any harmful acts they enact upon others [Foucault (1979), p.153]. Further researches with larger sample size are required to articulate such conceptual components when a cyber-forum is launching in the concerned research community.

There remains a big question of *how* to enlarge the 'public space' of collaborative knowledge-building cyber-discourse *under affective and cognitive dimensions* in a research community with sufficient degree of visibility and autonomy in the rights of less powerful workers, as Warschauer (1995) pinpointed:

"Electronic collaborative discussion, by bringing the comments of all into a field of visibility, provides ample opportunities for students to adjust their languages to a social audience and appropriate the language of others. How can these opportunities be maximized without sacrificing students' agency?"

Conception of collaborative knowledge-building cyber-forum

Blue-prints for collaborative knowledge-building discourse include students' cooperative searching out information on questions raised by individuals or groups, their mastery of analyzing, interpreting, negotiating and communicating techniques with inter-student tutoring, curiosity-driven learning motivation and goals, and life-like applications,

¹² Alexander, G. [in Kaye (1992), pp.203-4] argues that virtual images of humans faces can provide a sense of human personality, which can *preserve virtual identity*. But there are some technical constraints. In some cyber-forum, some software like Lotus-note cannot deliver on-line virtual human images.

interpretation and modifications of already learnt theories. On teachers' and educators' side, such discourse requires shared common values and missions in curriculum development, creative and strategic educational planning, risk-taking action research and thoughtful educational evaluation. Through free access to cyber-forum and resourceful internet webpages, there are potentials for updating teachers' propositional knowledge, transforming pedagogy and gaining thorough understanding of the effectiveness and efficiency of instructions [Adams, et al. (1990)]

Dillenbourg [(1999), pp. 6-9] categorizes the means of enhancing 'collaborative learning', by offering four categories. They are namely, setting up initial conditions for such learning to occur; specifying and clarifying the roles of group / peer partners; scaffolding productive interactions by encompassing interaction principles (probably in some IT medium) and devising feasible ways to monitor and regulate interactions. He goes on [(1999), pp. 10-17] to describe a variety of meanings for 'collaborative learning' as *situational characteristics, inter-and intra-group interactions, mechanical processes and effective evaluations*.

For further analysis, he contents that the four types of meanings have some determining conditions or correlational factors. Collaborative situations depend on action-, knowledge- or skill- and status-symmetry among group members, sharing common goals or value-beliefs and the degree of division of labor¹³. For a learning process, mechanisms require inductive methods, workers' cognitive load, self-explanatory abilities and conceptual or value conflict-resolution. Interactivity, synchronicity and negotiability of inter- and intra-group interactions deserve great attention. Lastly, evaluations of effects of collaborative learning raise two types of methodological issues. One refers to context- and interaction-specified evaluations and the second points to the mode of evaluation.

In collaborative knowledge building discourse, the power-cohesive dimension in the above listed framework in figure 1 has great impacts upon *status-symmetry and value sharing* in situational characteristics, *value conflict-resolutions* in specified areas and mode of evaluation, due to uneven power distribution among collaborative group members, framed in Foucault's notion of 'panopticon'.

Implications for addressing future research agendas

Based on the above sophisticated conceptualization of such discourse, there comes an urgent need to address further research agendas in the research community of the Faculty of Education at the University of Hong Kong:

- Very importantly, it is crucial to explain *theoretically how and why* interactivity, synchronicity and negotiability of human interactions can be enhanced in some IT

¹³ There is one subtle difference between cooperative and collaborative learning. In the former, a piece of works is divided into separate individual tasks whilst in the latter, the work is done altogether by all group members *without any task individualization*, observed by Dillenbourg [(1999), p. 11]. Similarly, Kaye [(1992), p. 5] also mentions the same point by distinguishing between '*individualized* (italics, mine) learning' and 'group performance'.

media like e-mail, cyber-forum, video-conferencing and hypertext learning in general.

- In (meta-) cognitive and affective domains, it is necessary to *describe how and explain why* the degree of division of labor in human communication is conceptually feasible, effective and efficient in cyber-forum, in particular.
- There remains a *big conceptual and pragmatic question to understand how to involve more progressive discourse or expand the 'public space'* in a cyber-forum through socio-cultural transformation, despite uneven power distribution among inter-and intra-group collaborative members. Relevant inter-disciplinary socio-cultural and cognitive studies need to be carried out.
- On-going evaluations using observation and interview¹⁴, survey apparatuses need to be proceeded to find out positive benefits of such cyber-forum to groups and their members and articulate necessary socio-cultural changes¹⁵ in the research community
- In view of distinctive cultural characteristics, revealed in some cross-national comparative study¹⁶, socio-cultural issues in classroom discourse and teacher education need to be addressed locally in Hong Kong, covering the *connectivity and accessibility* of IT regional and territorial resource networks within the affective, cognitive and power-cohesive domains in an extended knowledge building community¹⁷

End

¹⁴ In the above section, incomplete interview data with convenient sampling can *only describe how* such power relations influence interviewees' opinions about the feasibility of a knowledge-building cyber-forum when their 'private space' interacts with the commonly shared 'public space'.

¹⁵ Kiesler, S. in Kaye (1992), [pp. 147-165] similarly anticipates a necessary major structural change from a traditional classroom organization to more group- or team-centered collaborative environment. But such socio-cultural transformation may create more centralization of power handled by some authoritarian groups, despite more benefits gained by students and teachers in a paradigmatic shift of their roles in education. On evaluation, he lacks a theoretical framework to account for such possibilities and / or provide remedies or preventive measures.

¹⁶ A recent large-scale cross-national comparative study entitled 'the Second International Information Technology in Education Study' (abbreviated by SITES) in its Module 1 (1997-1999) reflected that the ICT use was highly correlated with value orientations in the school and classroom culture. Schools in those Asian countries (including Hong Kong) regarded ICT as *a pedagogical tool* for teachers whilst schools in Canada, Scandinavian and other western European countries treated the students' use of ICT as *learning aids* in assessing external databases through internet and in inter-person communications through e-mail. [Law; Yuen; Ki; Li; Lee (1999), p.14].

¹⁷ Similar to the above figure 1, *direct persons* involved in classroom discourse are teachers, students; and indirect ones are school administrators, IT co-ordinators, -technicians whilst in the field of teacher education, the involved persons are teacher trainees, course instructors and tutors, course organizers and technicians. Such are two different knowledge building communities.

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