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# Situating the Zone of Proximal Development

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## **Abstract**

Social constructivist theory has advanced the notion that distance education is inferior, because effective learning is thought to require immersion in a cognitive apprenticeship under the guidance of a mentor. Effective learning is said to be situated in activity, context, and culture as a collaboration in a community of practice. Administrators and practitioners in distance education are confronted with a challenge to the efficacy of their endeavors. The authors briefly trace the evolution of social constructivism, the influence of Piaget and Vygotsky, and analyze the effects of contemporary social constructivism with implications for instructional theory and practice.

## **Introduction**

Administrators of distance education enterprises are frequently moved to defend online instruction because of criticism and uncertainty about the nature of distance instruction. They are challenged to counter deeply embedded and frequently unquestioned beliefs that distance teaching cannot adequately provide a "virtual presence" sufficient to overcome the ontological fact of distance in terms of space, place, and intimacy. In spite of a substantial body of research demonstrating that there are no differences in achievement between online and traditional instruction, the belief persists that a distance education course is inferior to the "real thing" on campus. The ubiquity of social constructivism among practitioners and theorists, as posture or pedagogy, has contributed to a fragmentation of approaches and misinterpretation of distance technology as an instructional tool. Since spatial proximity is a prerequisite of social constructivism, the theories of cognitive apprenticeship and situated cognition condemn distance education for lacking the essential components of tangible mentors, peers, and contiguous social environments. A closer examination of the provenance of these theories may provide both instructors and distance education administrators with helpful principles for the effective integration of theory and defensible practice.

Distance education is held to different standards and higher expectations than conventional teaching. Distance learning is regarded as deficient because it is said to lack social experience and personal interactions apart from a community and the presence of a mentor. Social constructivism makes strong claims for deep and active learning. In social constructivism, students are said to acquire knowledge by participation in authentic tasks situated in an environment that is permeated with "distributed" knowledge (Gibson, 1979; Lave, 1988; Lave & Wenger, 1991). Brown and Duguid (2000) regard distance education as a poor substitute for classroom instruction, apparently because it lacks spatial and social proximity, although, ironically, they also contend that communities need not be spatially close. In a community a mentor or master teacher directs students by use of such techniques as modeling, scaffolding,

coaching, and fading. Despite instruction centered on a teacher and communal behaviors, the learning environment under social constructivism is still considered to be student-centered. The logic is explained partly by the two elements of evolved social constructivism, situated cognition and cognitive apprenticeship.

In situated cognition, mental construction is the result of authentic tasks, social interaction, and collaboration in context. Knowledge is distributed among persons and objects in a particular social context. Lave and Wenger (1991) argue that learning occurs through participation in action contexts. Situated cognition has been elaborated as cognitive apprenticeship (Collins, Brown, & Hollum, 1991; Brown, Collins, & Duguid, 1989). Cognitive apprenticeship, like apprenticeship in the trades, is a way to induct a neophyte into a work culture through a sequence of experiences that culminate in competence.

The rich abundance of metaphors and terminology generated by social constructivists—situated learning, collaborative learning, contextual learning, apprenticeship, community, scaffolding—leads to questions about how accurately the language of social constructivism reflects the epistemological and psychological bases found in the works of Piaget and, in particular, those of Vygotsky.

Since an emphasis on the importance of culture and context is a valid epistemological concern that may inform and influence practice, the question of the impact of the cluster of metaphors on professional practice must be entertained. The metaphorical coherence of a pedagogical framework or model is not necessarily an empirical validation. Cognitive apprenticeship, situated learning, and Vygotsky's zone of proximal development (ZPD) are collapsed into a simple bromide such that instruction is a classroom technique to guide a student to complete a task. One is tempted to distinguish between an instructional scheme and an instructional model. Instructional schemes are staged practices based on loose or nonexistent relationships to established epistemological and psychological principles. The elements of an instructional model may yield metaphorical terminology, but do they have an integral and accurate relationship to known principles? A review of social-constructivist models and the basic tenets of Vygotskian and Piagetian theories should lead to some preliminary conclusions in this respect.

### **The Influence and Interplay of Vygotsky and Piaget on Sociocultural Theories**

The origins of constructivism have been attributed to many (e.g., Jean Piaget, Lev Semyonovich Vygotsky, John Dewey, and Giambattista Vico), but the contemporary growth of constructivism in the classroom owes much to the work of Jerome Bruner (1966) who advocated discovery learning as an alternative to conventional instruction. Bruner's notion was straightforward—that students would better learn and retain concepts they discover on their own instead of passively through rote learning and lectures. Bruner rooted his pedagogy in Piagetian and Vygotskian principles and extended the work of Vygotsky by employing the concept of scaffolding. With the passage of time, social constructivist theory now reinforces teacher-centeredness. To understand how the switch from student-centered to teacher-centered instruction seems to have come full circle, it is necessary to consider the procession of social constructivism.

Language and psychological processes develop initially as social, interpersonal interactions among people, which Vygotsky referred to as interpsychological. These are gradually "turned inward" or incorporated as internal tools, which he referred to as intrapsychological. The infant and the child learn first learn by imitating the immediate social environment, which is influenced in different ways by the larger culture. One's psychological processes are always bound to the culture in some way because each person must use a particular "set" of cultural tools into the

society in which one is born or cast. In the second instance, the child begins to think for himself. Vygotsky (1978) revealed his basic theory about human cognitive development with this statement:

...the most significant moment in the course of intellectual development, which gives birth to the purely human forms of practical and abstract intelligence, occurs when speech and practical activity, two previously completely independent lines of development, converge (p. 24).

One significance of this "convergence" is that internal speech is ultimately used for thinking, reasoning, solving problems, and learning. Vygotsky (1978) said, "The internalization of socially rooted and historically developed activities is the distinguishing feature of human psychology, the basis of the qualitative leap from animal to human psychology" (p. 57).

Social constructivists emphasize the importance of the ZPD, which seems to have been elevated to the status of a quintessential core practice. Gredler and Shields (2004) declare that the common understanding of the ZPD as an educational model is wrong, because Vygotsky defined it as an area of maturing psychological processes and a construct for understanding social influence in ontogenesis. Vygotsky (1978) put it this way:

The zone of proximal development defines those functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state. These functions could be termed the "buds" or "flowers" of development rather than the "fruits" of development. The actual developmental level characterizes mental development retrospectively, while the zone of proximal development characterizes mental development prospectively (p. 87).

Vygotsky also said the ZPD is the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Vygotsky elaborated by describing how a teacher or a more advanced peer might provide an explanation to enable a child to attain a higher level of achievement with support. The importance in developmental theory is not the actions of a capable adult or peer but, rather, the learner's state of cognitive maturation. External stimuli are consequential to a learner "only to the degree that he can assimilate them by means of his existing structures" (Piaget, 1969, p. 5). This is in concert with Vygotsky's contention that cognitive development can be assessed within the ZPD. To Vygotsky, the evaluation of cognitive maturation in the ZPD is the major purpose, but this has been disregarded in favor of its relevance to pedagogy.

Cognitive apprenticeship, situated cognition, and the ZPD reflect the power hierarchy by affirming the teacher's role while apparently attempting to also endorse the primary constructivist principle of self-created knowledge. Cheyne and Tarulli (1999) made this observation:

The social relationship that stands as a model for Vygotsky is markedly asymmetrical, hierarchical, and organized around the developmental goal of instrumental control. Moreover, the master-slave, supervisor-subordinate relationship is itself a social transformation of the worker-tool relation and hence it is easy for Vygotsky to recover, through reciprocal transformation, the tool-like instrumentality of inner speech from such social relationships. Social relationships are based on the same labour-production instrumentality as

action-tool relations. All of this is organized around the issue of control which, through ontogenesis, becomes transformed from that of an external agent over a subordinate to one of an internal agent over self and ultimately to a principle over an instance. . . Vygotsky's metaphor also highlights another significant ingredient of such dialogue—power. Vygotsky, at least in his view of the ZPD, clearly portrays a knowledge differential as power differential. That differential brings into focus the role of the other in the ZPD (para 27).

Distributed knowledge emanates from an authoritarian hierarchy. Knowledge production is entrusted to the school by the culture with explicit and implicit rules that define the practices and the agencies of governance. Administrators, teachers, and professors are certified or licensed by the state or a professional organization, as are the programs that train them; the curriculum is prescribed, and policies are established to define the extent of control over employees and students and what students may learn. Professional and/or governmental organizations evaluate both the work of schools (accreditation) and the knowledge production of those who contribute to the methodology and pedagogy deemed acceptable in schools (peer review). Education is governed amid a set of countervailing forces where no individual valence prevails: federal and state laws, policies, courts, cultural narratives, standards, legal interpretations, professional agencies, organizations, elected officials, appointed administrators, teachers, parents, students, and more. The educational institution exists as a compromise among sources of power.

The ZPD, scaffolding, and the apprenticeship are embedded in the power structure as tools of control, both as a way to initiate neophytes into a community of practice and to define and deliver the curriculum. While there is a clear similarity between Piaget's theories of accommodation and assimilation and Vygotsky's theory of cognitive maturation as evaluated by the ZPD, the ZPD seems to be more appealing to the practitioner or theorist as an instructional device.

The progression of theoretical perspectives coincides with the shifts in pedagogical philosophy over time. Teachers who found themselves watching students individually engaged with programmed learning materials repudiated behaviorism. However, banishment of behaviorism by constructivism, owing to the epistemological view that learning is self-created, (the so-called psychological constructivism of Piaget), relegated the teacher to the fringes as a guide. Social constructivism restores the teacher firmly at the head of the instructional process, reinforced by the social metaphors of situated cognition, cognitive apprenticeship, and the ZPD. The teacher determines the instructional use of the ZPD by judging "right" and "wrong" answers, and "correct" and "incorrect" procedures. The ZPD is a deliberate strategy to engage the student, connect prior understanding with new content or skills, and assist the student to achieve predetermined outcomes. While the ZPD is popularly regarded as "scaffolding" or "support" to allow learners to achieve success, it involves a deliberate restriction of a student's choices (Wood, Bruner, Ross, 1976).

Some constructivist practitioners are hesitant to state goals or objectives for teaching out of respect for the cardinal principle of constructivism—that knowledge cannot be imposed. However, their instructional practices reveal intended instructional outcomes, otherwise how could the ZPD be employed? When the mentor is engaged either in modeling a sequence of manual skills or mental concepts (making thinking visible), the mentor evidently has goals and objectives in mind. Feedback along the way (i.e., scaffolding, coaching, fading) is for the purpose of imposing a specific process and reaching a specific outcome. The language chosen by social constructivists conforms to constructivist principles but truly emphasizes the instructor's role. In doing so, practitioners of social constructivism may ignore a major element of the principles of

their epistemological history, or at least the writings of Bruner. The hope expressed in nascent constructivism of the 1960s was that teaching would surrender didactic practice in the interest of active, engaged learning.

### **Locating the ZPD**

If conceptual knowledge is a tool, it can be used by the learner apart from the mentor and the classroom environment. An observation by Vygotsky (1978) has particular importance for work inside the ZPD:

The central characteristic of elementary functions is that they are totally and directly determined by stimulation from the environment. For higher functions, the central feature is self generated stimulation, that is, the creation and use of artificial stimuli which become the immediate causes of behavior (p. 39).

It is at this point that one must observe that both Vygotsky and Piaget recognized a developmental juncture at which the individual character of the learner is asserted and the dialogue central to the learning process becomes discreet rather than only communal. Knowledge begins in context methodologically and phenomenologically; it survives as truth when individual mental processes and subjective intentionality sustain it. Like Piaget, Vygotsky believed that conceptual thinking develops at adolescence when there are logical relationships among concepts. At this stage, knowledge and thinking are relevant psychological tools—only if they affect the mind and behaviors of the individual. Unless it can influence thought and behavior, a psychological tool is not useful for any particular individual. While many tools exist in the culture, not everyone can use them without proper experiences and mental development. Psychological tools enable independent mental functions free of the immediate environment for those who can use them.

A student learns through socialization and individual effort, but the uses of books, e-mail, online courses, videos, or other artifacts are imbued with social content and context. These tools are situated, if one accepts the view of distributed knowledge. A book, video, and a computer environment can be used for meaning-making without continuous, direct, personal contact with a teacher. Indeed, the Oxford tutorial may be said to be work in the ZPD, where students must assume an active role in learning, develop self-directed study skills, work independently, all of which are individual pursuits punctuated by intermittent evaluations by a tutor (Palfreyman, 2002). Vygotsky demonstrated that what is learned in the classroom can be applied elsewhere in the absence of a teacher. Vygotsky (1987) described the ZPD or collaboration as "invisibly present" (p. 216), which may be the case with children and adults. Presumably, such collaboration can also be made over the Internet and used as a referent for further work, invisible or not. The concept of the ZPD is much different when applied to a mature learner rather than to a child.

Wilson (2002) argues that human cognition can occur "decoupled" from immediate interaction with the environment and that large portions of cognitive processing are not situated. "In short, our ability to form mental representations about things that are remote in time and space, which is arguably the *sine qua non* of human thought, in principle cannot yield to a situated cognition analysis" (Wilson, 2002, p. 625). Brown, Ash, Rutherford, Nakagawa, Gordon, & Campione (1993) claim that the ZPD may include people and such artifacts as books, videos, wall displays, scientific equipment, and "a computer environment intended to support intentional learning" (1993, p. 191).

## Social Distance and the ZPD

Saba (2004) rejects the comparison of conventional instruction with distance education, saying "...comparison of interaction in the context of classroom instruction with the kinds that occur in distance education becomes difficult, if not irrelevant" (para 2). But deeply entrenched metaphors are not so easily dismissed. Comparisons of different distance education models with conventional instruction find few significant differences in achievement (Haythornthwaite, Kaymer, Robins, & Shoemaker, 2000; Russel, 1999). Regardless of the differences in spatial proximity, a way to compare programs is to put both "places" on common ground by means of transactional distance (Moore, 1972; Moore, 1980; Moore & Kearsley, 1996). Transactional distance is a relative pedagogical construct that envisions the transactions between a teacher and a learner to operate among three variables: structure, dialog, and learner autonomy. Structure is the extent of the responsiveness to a learner's individual needs, dialog is the extent to which a learner and educator are able to communicate with each other, and learner autonomy is a student's commitment to self-direction and study. Moore proposed that these factors characterize both distance education and the classroom, and some writers claim to have confirmed the theory (Chen, 2001; Bischoff, Bisconer, Kooker, & Woods, 1996; Saba & Shearer, 1994).

Programs differ in transactional distance according to the extent of dialogue and structure within them, and the characteristics of each learner. A distance or online model can have high or low structure, dialog, and learner autonomy. The dialog between the instructor and the student can be achieved with technologies now available to all instructors, but teachers and students must learn how to use them in the ZPD. Multimedia programs, books, and videotaped lectures, a "worked example," discussion board, or other artifacts can provide the necessary social stimuli for learning.

When a metaphor becomes specific its applicability narrows, restricting the range of what is possible. This may be the case with the metaphors of apprenticeship and situated cognition whose implications are that learning can only occur in a classroom (i.e., spatial proximity). Also, equating the ZPD with the apprenticeship is false. Seeing instruction only as an apprenticeship leads to solipsistic excesses. If social constructivism is true to its foundations, then internal speech and logic are valid cultural tools, and learning can occur with electronic representations of the instructor as well as with instructors in the flesh. Vygotsky (1930) said:

As an individual only exists as a social being, as a member of some social group within whose context he follows the road of his historical development, the composition of his personality and the structure of his behaviour turn out to be a quantity which is dependent on social evolution and whose main aspects are determined by the latter. Already in primitive societies, which are only just taking their first steps along the road of their historical development, the entire psychological makeup of individuals can be seen to depend directly on the development of technology, the degree of development of the production forces and on the structure of that social group to which the individual belongs (para 4).

The relative intimacy of one instructional environment as opposed to another is questionable as an epistemological trait. This inference is probably related to a misunderstanding of the nature of knowledge for Piaget, Vygotsky and Bruner—none of whom can be accused of having asserted that the validity of learning depends on some kind of continuous, intimate social process of validation. Vygotsky and Piaget agreed that the learning process culminates with the autonomy of the learner. Independent knowledge is neither place-specific nor situated. If Piaget and Vygotsky were correct, abstract knowledge is transformed knowledge, neither bounded by nor restricted to

situations in which it was originally constructed. As Vygotsky put it, in contrast to situated cognition, "becoming a master of one's own behavior" rather than a "slave to the environment" (Vygotsky, 1978).

## Conclusions

Directed thought, which is internal and occurs without communication with another, is social thought that is increasingly influenced by experience and logic and no longer tied to an immediate social context. Higher mental processes engage the "social" interactions of inner speech to create new knowledge. Vygotsky proposed that human beings achieve control over natural mental functions by bringing socioculturally formed mediating artifacts into thinking activity (Lantolf & Thorne, 2005). Cultural artifacts mediate human activity and they are always situated within a human activity system (Petrina, 2004).

Vygotsky's references to artifacts included many kinds of tools (Vygotsky, 1978). Bannon and Bødker (1991) emphasize the process and the context in which a tool is used is important because cognition is "socially and historically situated, and it is tied to the physical conditions in which it takes place" (p.227). Tools are discarded if they are no longer useful. Obviously, many young people today do not recognize or know the purpose of a "church key" or the horse-hoof awl on a Swiss army knife, because these tools are obsolete. On the other hand, many children and youth can use computers and software as tools, something some of their teachers cannot do. Learners can only employ the new media artifacts inside the ZPD if they have the ability to do so, and teachers cannot take advantage of them unless they also know how to use them.

It is indefensible to maintain that existing and emerging electronic instructional tools in distance education lie outside the ZPD. As John-Steiner and Souberman (1978), the editors and translators of *Mind in Society*, explained, "Vygotsky argued that the effect of tool use upon humans is fundamental not only because it has helped them relate more effectively to their external environment but also because tool use has had important effects upon internal and functional relationships with the human brain" (p 132-133). The emphasis that social constructivism puts on historical development implies that online learning and self-study are possible because a learner has inherited evolved cultural tools deliberately devised for intentional learning. Social constructivists who would restrict learning only to a classroom appear to assume that the "tools" of learning, in the Vygotskian sense, are constants not subject to independent use or cultural evolution. Vygotsky maintained that the psychological processes change with sociocultural history, evolving with the culture, which is the case with distance education. Seen in this light, some social constructivists may be guilty of the perennialist error of absolutism.

Technological adaptations address the perceived need for socialization and, properly used, may be effective artifacts for learning. These include electronic listservs (forums, threaded discussions); e-mail, instant messaging, chat; video; radio and audio; anchored instruction (CTGV, 1990, 1993); computer-supported collaborative learning (Bowers & Benford, 1991; Heilesen, Cudrio, & Cheesman, 2002; Etheris & Tan, 2004); computer supported intentional learning environment CSILE (Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989; Salovaara & Järvelä, 2003); learning communities (Barab & Duffy 2000); cognitive flexibility hypertext (Spiro, Feltovich, Jacobson & Coulson, 1992; Godshalk, Harvey, & Moller, 2004); goal-based scenarios (Schank, 1996; Naidu, Ip, & Linser, 2000); and, case-based learning (Kolodner, 1993; Tsinakos & Margaritis, 2001). Administrators and practitioners in distance education continue to create innovations that may also augment the traditional classroom and the apprenticeship. Mature learners can recognize the ZPD for themselves as an intrapsychological process. There is no reason to believe that people cannot learn through distance education or

through any other, as yet undiscovered, socially-constructed artifact for that purpose, for it is obvious that this is exactly what learners do. The ZPD is situated with the mature learner.

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## References

- Bannon, L.J. & Bødker, S. (1991). Beyond the interface: Encountering artifacts in use. In J. Carroll (ed.) *Designing Interaction: Psychology at the human-computer interface*. New York: Cambridge U.P, pp. 227-253.
- Barab, S. A., & Duffy, T. (2000). >From practice fields to communities of practice. In D. Jonassen, & S. M. Land. (Eds.). *Theoretical Foundations of Learning Environments* (pp. 25-56). Mahwah, NJ: Lawrence Erlbaum Associates.
- Bischoff, W. R., Bisconer, S.W., Kooker, B. M., and Woods, L.C. (1996). Transactional distance and interactive television in the distance education of health professionals. *The American Journal of Distance Education* (10)3, 4-19.
- Bowers, J. M., & Benford, S. D. (Eds.) (1991). Studies in computer supported cooperative work: Theory, practice and design. *Proceedings of ECSCW 89*. Amsterdam, The Netherlands: North-Holland.
- Brown, J.S. & Duiguid, P. (2000). *The Social life of Information*. Cambridge, Mass.: Harvard University Press.
- Brown, A.L., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A. & Campione, J.C. (1983). Distributed in the classroom. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp.188-228). New York: Cambridge University Press.
- Brown, J.S., Collins, A. & Duguid, S. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.
- Bruner, J. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.
- Bruner, J. S. (1990). *Acts of meaning*. Harvard University Press. Cambridge, MA.
- Chen, Y. (2001). Dimensions of transactional distance in the world wide web learning environment: a factor analysis. *British Journal of Educational Technology* 32 (4), 459-470.
- Cheyne, J.A., & Tarulli, D. (1999). Dialogue, difference, and the “third voice” in the zone of proximal development. *Theory and Psychology*, 9, 5-28.
- Cole, M. & Wertsch, J. V. (1996). Beyond the individual-social antimony in discussion of Piaget and Vygotsky. *Human Development*, 39, pp 250-256.
- Collins, A., Brown, J.S., and Newman, S.(1989). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics. In L.B. Resnick (Ed.) *Knowing, learning and instruction: Essays in honor of Robert Claser*. Hillsdale, NJ: Lawrence Erlbaum.
- Collins, A., Brown, J.S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator*, 6(11), 38-46.
- CTGV (1990). Anchored instruction and its relationship to situated cognition. *Educational Researcher*, 19 (6), 2-10.
- CTGV (1993). Anchored instruction and situated cognition revisited. *Educational Technology*, 33 (3), 52- 70.



- Etheris, A.I. & Tan, S.C. (2004). Computer-supported collaborative problem solving and anchored instruction in a mathematics classroom: an exploratory study. *International Journal of Learning Technology*, 1(1): p. 16-39.
- Godshalk, V.M., Harvey, D.M. & Moller, L. (2004). The role of learning tasks on attitude change using cognitive flexibility hypertext systems. *Journal of the Learning Sciences*, 13(4), p. 507-526.
- Gibson, J.J. (1979). *The Ecological approach to visual perception*. Boston: Houghton Mifflin.
- Gredler, M., & Shields, C. (2004). Does no one read Vygotsky's words? Commentary on Glassman. *Educational Researcher*, 33(4), 21-25.
- Haythornthwaite, C., Kaymer, M., Robins, J., & Shoemaker, S. (2000). Community development among distance learners: temporal and technological dimensions. *Journal of Computer-Mediated Communication*, 6(1). <http://www.ascusc.org/jcmc/vol6/issue1/haythornthwaite.html>
- Heilesen, S.B., Cudrio, M.C. & Cheesman, T.R. (2002). *Distributed collaborative teaching and learning in a groupware environment*. <http://newmedia.colorado.edu/cscl/166.html>
- John-Steiner, V. & Souberman, E.(1978). Afterword. In Vygotsky, L.S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- Kolodner, J.L. (1993). *Case-based reasoning*. Morgan Kaufmann, Calif., US.
- Lantolf, J.P. & Thorne, S. (2005) *SCT and the genesis of L2 development*. Oxford: Oxford University Press. [http://www.wisc.edu/english/rfyoung/715/06.internalization\\_theory.pdf](http://www.wisc.edu/english/rfyoung/715/06.internalization_theory.pdf)
- Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge, UK: Cambridge University Press.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Moore, M. (1972). *Learner autonomy: The second dimension of independent learning*. *Convergence* 5(2): 76-88.
- Moore, M. (1980). Independent study. In Boyd, R. and J. Apps, (Eds) *Redefining the discipline of adult education*. San Francisco: Jossey?Bass.
- Moore, M. G. & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.
- Naidu, S; Ip, A; Linser, R. (2000) Dynamic goal-based role-play simulation on the web: A case study. *Educational Technology & Society* 3(3) p. 190-202.
- Palfreyman, D. (2002). *OxCHEPS Occasional: Paper No. 1*. Oxford Centre for Higher Education Policy Studies, at New College, Oxford, OX1 3BN, UK. Online: <http://www.new.oxford.ac.uk/oxcheps>
- Petrina, S. (2004). Curriculum and instruction for technology teachers. Online: <http://www.cust.educ.ubc.ca/programs/tsed/research/books/>
- Piaget, J. (1962). *Comments on Vygotsky's critical remarks concerning "The Language and Thought of the Child" and "Judgment and Reasoning in the Child by Jean Piaget"*. Online: <http://www.marxists.org/archive/vygotsky/works/comment/piaget.htm>

- Piaget, J. (1969). *Science of education and the psychology of the child*. New York: Grossman Publishers.
- Roschelle, J. (1996). Learning by collaborating: Convergent conceptual change. In T. Koschmann (Ed.), *CSCL: Theory and Practice of an emerging paradigm* (pp. 209-248). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Russell, T.L. (1999). *The no significant difference phenomenon*. Raleigh: North Carolina State University.
- Saba, and Shearer, R. (1994) Verifying key theoretical concepts in a dynamic model of distance education. *The American Journal of Distance Education*. 8 (1) 36-59.
- Saba, F. (2004). Interaction in distance education. *Editor's note*. Online: [http://store.distance-educator.com/product\\_info.php?products\\_id=83](http://store.distance-educator.com/product_info.php?products_id=83)
- Salovaara, H. & Järvelä, S. (2003). Students' strategic actions in computer supported collaborative inquiry. *Learning Environments Research*, 6(3), 267-284.
- Scardamalia, M., Bereiter, C., McLean, R. S., Swallow, J., & Woodruff, E. (1989). Computer supported intentional learning environments. *Journal of Educational Computing Research*, 5, 51-68.
- Schank, R. C. (1996). Goal-based scenarios: Case-based reasoning meets learning by doing. In D.B. Leake (Ed). *Case-based reasoning*, (p.295—348). Cambridge: MIT Press.
- Spiro, R.J., Feltovich, P.J., Jacobson, M.J., & Coulson, R.L. (1992). Cognitive flexibility, constructivism and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. In T. Duffy & D. Jonassen (Eds.), *Constructivism and the technology of instruction*. Hillsdale, NJ: Erlbaum.
- Tsinakos, A.A. & Margaritis, K.G. (2001). Employing case based reasoning in asynchronous distance education. *Learning Technology*, 3(3). Online: [http://lttf.ieee.org/learn\\_tech/issues/july2001/index.html#3](http://lttf.ieee.org/learn_tech/issues/july2001/index.html#3)
- Vygotsky, L.S. (1930). *Mind and society*. Online: <http://www.marxists.org/archive/vygotsky/works/mind/index.htm>
- Vygotsky, L. S. (1931). *The development of thinking and concept formation in adolescence*. Online: <http://www.marxists.org/archive/vygotsky/works/1931/adolescent/ch10.htm>
- Vygotsky, L.S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- Vygotsky, L.S. (1987). *The collected works of L.S. Vygotsky. Vol.1: Problems of general psychology*. Including the volume Thinking and speech. R.W. Rieber & A.S. Carton, Eds., N. Minick, Translators. NY: Plenum Press.
- Vygotsky, L. S. (1994). Imagination and creativity of the adolescent. In R. Van der Veer & J.Valsiner, Eds. *The Vygotsky reader*. Oxford: Blackwell, p. 266-88.
- Vygotsky, L. S. (1997). The history of the development of higher mental functions. In L. S. Vygotsky, *Collected works*. Volume 4. New York: Plenum Press.
- Wilson. M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9:4, pp. 625-636(12)
- Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of child Psychology and Psychiatry*, 17, 89-100.

