

INTEGRITY, COMPLETENESS AND COMPREHENSIVENESS OF THE LEARNING ENVIRONMENT:

Meeting the Basic Learning Needs of All Throughout Life

Jan Visser¹

WHAT'S IN THIS CHAPTER?

The centerpiece of this chapter is an attempt to overcome the limitations of current conceptions and definitions of learning, i.e. to 'undefine' the concept and give it new meanings. The beginning of the chapter provides a rationale for this attempt. The section on 'Conceptual Background' does so with reference to current thinking about the issue. It is followed by two sections, the first on 'Learning in a Turbulent World' and the second on 'Constructive Interaction with Change,' both of which explain why existing visions of learning are outdated and need to be replaced by new ones. The remaining part of the chapter explores the implications of this new definition for how the basic learning needs of all throughout life can be met. It highlights some of the key challenges ahead and the need to address them in a comprehensive fashion, rather than

¹ Jan Visser is UNESCO (United Nations Educational, Scientific and Cultural Organization) Director for Learning Without Frontiers (information available online at <http://www.unesco.org/education/lwf/>) and Founding President of the Learning Development Institute (information available online at <http://www.learndev.org>). Any opinions expressed in this chapter are entirely those of the author and do not necessarily reflect official policy of UNESCO or the Learning Development Institute.

one by one. I conclude the chapter with reference to UNESCO's work on Learning Without Frontiers, a four-year old effort to rethink the world of learning and to create new realities, focusing on the organic integration of the learning environment. Several recommendations are made, based on the Learning Without Frontiers experience, regarding directions for the future.

CONCEPTUAL BACKGROUND

The suggested title for this chapter was "Providing Basic Education for All Through Flexible Mode Delivery." I am deviating from the original title to broaden the scope of my pursuit. I argue that 'meeting the basic learning needs of all throughout life' is a challenge significantly more comprehensive and complex than that of 'providing basic education for all.' The original meaning of the verb 'to provide' (*pro videre*) is 'to foresee.' In conjunction with the word 'education' it is commonly interpreted as 'to furnish,' 'to supply,' or 'to deliver.' The notion of delivery is tied in with a paradigm that is worth challenging, namely the idea that learning consists of acquiring pieces of information or knowledge and that, in order for that to happen, such information should be delivered to the learner. In this view, information and knowledge are essentially conceived of as commodities. Similarly, the learner is seen as a recipient of information and of prompts to process information, rather than as a participant in a dialogic process to create meaning. Creating the conditions of learning, in that same view, boils down to an external intervention, aiming at optimizing what is being delivered to the learners, and how they are prompted to act upon it, so as to attain defined learning goals in the most effective and efficient ways possible. No doubt, multiple decades of research and practice, particularly within the instructional design tradition, have shown the considerable value of this view. Both the strength of past achievements and the need for fundamental review and reconceptualization stand out in the ongoing debate as reflected in such overview works as Jonassen (Ed.) (1996); Reigeluth (Ed.) (1999); Dills & Romiszowski

(Eds.) (1997). These concerns have similarly been discussed in numerous special issues or special segments of *Educational Technology* since Volume 31, Number 5, introduced in that issue by Duffy & Jonassen (1991). A related debate has been going on in a series of issues of *Educational Researcher*, starting with Volume 25, Number 4, of which I particularly note Greeno's (1997) and Sfard's (1998) contributions. In addition, almost the entire Volume 23 of the *Review of Research in Education* focuses on these matters, particularly the chapters by O'Connor (1998) and Salomon & Perkins (1998).

Notwithstanding the important advances made, as they transpire from the above debate and developing innovative practice, many of our views of learning remain incomplete. Particularly, discourse and action continue to focus too exclusively on learning pursued for specific purposes and confined to narrowly defined contexts, such as the classroom and training environment, dealt with in isolation from one another, without recognizing the larger context of which they are part.

The importance of attending to contextual factors was brought out as early as 1978 by McAnany. It was later highlighted by Visser & Buendia Gomez (1989), particularly in relation to the often haphazard circumstances that surround interventions to facilitate learning in developing countries. If such circumstances are not taken into account in the design process, the outcome of the interventions is likely to depend more on context than on the conditions put in place by design. Jonassen & Rohrer-Murphy (1999) make the same point with reference to a different rationale, namely the consideration that learning and action are dialectically related, and that learning therefore is not a precursor to activity, but that it emerges from conscious engagement in and reflection on it. As "activity cannot be understood or analyzed outside the context in which it occurs" (p.62), there is a powerful argument for broadening the scope beyond the traditional boundaries of regular design and planning concerns. Tessmer & Richey (1997) also indicate the

need not to limit design concerns to the intervention as such, but to consider the context of which learning, performance *and* design are part. Visser & Berg (1999) emphasize this need from a yet wider perspective, namely the *environmental* responsibility of the designer of learning conditions. If learning is to be conceived as all-pervasive and lifelong, and if it is engaged in by both individuals and communities, then any particular intervention cannot be seen as disjointed from the totality of the learning environment, nor must it be conceived of in isolation from the long-term learning history of the learning entity (or entities) involved. Any intervention, independent of the question how effective it is in terms of traditional design criteria, can therefore be anywhere between the extremes of being detrimental to the learning environment at large or contributing to its development in positive ways.

This consideration can be further placed in the context of an ecological vision of the learning environment. Visser (1999a) argues that an ecological vision is necessary to overcome the fragmentation of existing views of learning. Both a broadening and the development of multiple and complementary perspectives of the learning landscape are required. Attention to the whole is as much needed as care for detail. An ecological awareness is required to see how the different pieces of the learning environment as a whole hang together, interact with each other, function in the context of the whole, and allow the whole to acquire a meaning over and above the sum of its parts.

Flexibility is an important dimension of the learning ecology proposed in this chapter, and it has to do with more than just delivery mechanisms. There are other important criteria that characterize an environment² that is truly adequate for promoting and facilitating learning in the

² The term 'learning environment' is used here in a broad sense, comprising the learning ecology as a whole as it pertains, for instance, to the totality of conditions put in place in a particular society or even beyond. It is distinct from its more common, and more restrictive, use to describe the conditions pertaining

sense in which I refer to learning in this chapter, namely as an essential requirement for sustainable growth. Some of the key characteristics of such a learning environment have to do with its capability to accommodate interaction, collaboration, networking and adaptive growth and its ability to foster learning that is rooted in the real world, i.e. that goes beyond the traditional obsession with disciplinary knowledge and recognizes the wholeness – or consilience (O. E. Wilson 1998) – of knowledge.

LEARNING IN A TURBULENT WORLD

To place the above reflections in context, consider the following. Hominid beings, in varying stages of development, have populated the earth for millions of years. Ten thousand years ago the human population is estimated to have been some eight million worldwide. This was the time when, due to changing circumstances and necessity, agriculture became the norm, rather than an add-on to hunting and gathering, causing the human population to rise exponentially ever since (Tudge 1998). At the beginning of the Christian era our number is thought to have been some 250 to 300 million [the lower estimate is cited by Koestler (1989, originally published 1967); the higher estimate can be found in Sakaiya (1991)³]. Sixteen centuries later the global population had risen to 500 million. It took another two centuries for it to double to one billion. The three billion mark was reached only a century and a half later in 1960. At the time of writing, that number has doubled to six billion. “It took all of human history for the world's population to reach 1 billion in 1804, but only 156 years to reach 3 billion in 1960. Now, 39 years later, the number has doubled” (Vanderkam 1999).

to particular intentional learning events, such as referred to, from different perspectives, in Grabinger (1996); Hannafin, Land and Oliver (1999); Jonassen (1999); McVey (1996); or B. G. Wilson (1995).

³ Tudge (1998, p.50) puts this number “between one hundred and three hundred million.

What will happen next is an open question. Different predictions exist. One thing is clear, however – to quote Arthur C. Clarke (1992, p.169) only slightly out of context – “the future isn’t what it used to be.” We live in a time of turbulent change and it is here to stay for the foreseeable future. We have reached a critical point. The question ‘What caused what?’ may be irrelevant. However, the fact that we are reaching the limit of how the resources of the planet Earth can sustain the processes we have put in place has arguably something to do with the increasing population pressure. The phenomenon of explosive change, demonstrated by the demographic figures cited above, is reflected in many other areas, such as the development of technology and science. It can be argued that the dramatic changes in population growth would not have been possible had there not been similarly dramatic development in, for instance, agriculture and medical science. Reversing the direction of causality, it can equally be argued that, as we continued to multiply, there was an ever-greater need for technological solutions to the problems generated by demographic growth. We humans demonstrate an incredible capacity to drive things to the edge, thereby creating problems at an increasing rate that require solutions that themselves drive things even further to the edge, thus calling for problem solving at the subsequent level, and so on.

Koestler (1989/1967, p.319) has called this the age of climax. He notes that “our mind is willing to accept that things are changing, but unable to accept the *rate* at which they are changing, and to extrapolate into the future.” Things become particularly problematic when even the rate of change is changing. Pais (1997, p.474) refers in another way to how such turbulent change boggles the mind and frustrates our capacity to manage the world the way we previously did. He refers to two time scales, one expressed in the roughly 20-year timeframe that marks the leadership of a particular human generation before it passes on to the next one, and the other “the period after which existing information and technology become obsolete. A critical point is reached when the

second period becomes shorter than the first one.” Pais goes on to suggest that then “the experience of the older generation is no longer all that helpful” and notes that the crucial changeover perhaps fell in the nineteen-sixties, i.e. a generation and a half ago. Those old enough to remember may recall that, indeed, that was about the last time when school graduates could have the illusion that they had prepared themselves for life and that the time of learning was over. Until only a few decades ago it was therefore possible to conceive of learning – even though wrongly – as a process that could serve the purpose of adapting to change by having each generation prepare the schooling conditions for the next one. The need to attend to adjustments required in later life through the occasional refresher course or, if need be, retraining program, could then be seen as a sensible add-on correction to an otherwise adequate model.

CONSTRUCTIVE INTERACTION WITH CHANGE

The term ‘learning’ generally remains poorly defined in most of the educational literature. Often it is a taken-for-granted concept, implicitly defined as the consequence of instruction⁴. Consequently, we know much about the instructional process, but little about learning. A simple experiment shows the anomaly of this situation. Ask mature adults what their most profound and relevant learning experiences have been. Rarely will one get a response that is even slightly reminiscent of the above definition.

⁴ One explicit definition (Hilgard 1948, p.4) states that “learning is the process by which activity originates or is changed through training procedures...as distinguished from changes by factors not attributable to training.” De Vaney and Butler (1996, p.8) underline this definition’s influence on the behavioral school. Only quite recently, this close linkage with instruction starts to disappear. Driscoll (2000, p. 11), for instance, stresses, with reference to her analysis of different learning theories, that “they do share some basic, definitional assumptions about learning. First, they refer to learning as a persisting change in human performance or performance potential.” However, distinctly different from Hilgard’s definition, she continues to say that “Second, to be considered learning, a change in performance or performance potential must come about as a result of the learner’s experience and interaction with the world.”

To measure the effectiveness of instructional processes we look at learning outcomes. Such learning outcomes are typically defined in terms of particular skills, intellectual ones or motor behaviors, and sometimes tendencies to apply particular behaviors in appropriate circumstances, i.e. attitudes. Little do they reveal about why we acquire such skills and about the human and social processes involved. Particularly, the tendency to interpret learning as the result of instruction has resulted in serious under-attention to any form of learning that is not the consequence of an instructional intervention. Moreover, it hampers, as Burnett (1999) argues, creativity in thinking about new approaches to learning and of ways to facilitate it. Turning the argument around, and referring to Felman's (1982, p.21) discussion of statements by Socrates and Freud regarding the "radical impossibility of teaching," Burnett observes that "a *recognition* of the "impossibility" of teaching, enables and encourages the development of new and innovative approaches to pedagogy and learning."

I have referred above to what most essentially characterizes the present juncture in time: turbulent change and complexity in a world that is increasingly interconnected in the sense that what happens in one place and at one particular moment can – but does not necessarily – set off dramatic developments elsewhere. Popular books like Waldrop's (1992) *Complexity: The Emerging Science at the Edge of Order and Chaos* abound with compelling examples of everyday phenomena, in addition to those that pertain to the most profound questions posed by the scientific community, that leave little doubt about the relevance and necessity of any ordinary citizen's ability to understand such phenomena and to interact with them in intelligent and constructive ways. The ability to see the whole as well as the detail; the disposition not to feel trapped in a false dilemma of 'either-or' choices between different levels of the same reality; the readiness to appreciate the limitations of Aristotelian logic, these are all rapidly becoming essential ingredients of *literacy*, in a redefined sense, for those who are to play effective and

responsible roles in the world of the twenty-first century.⁵ The need to move beyond narrow concerns with disciplinary knowledge in recreating the world of learning is argued by Nicolescu (1999) with particular reference to the four pillars of education proposed in the Report to UNESCO of the International Commission on Education for the Twenty-first Century, *Learning: The Treasure Within*, (Delors *et al.*, 1996). Nicolescu thus calls for approaches that address “the open totality of the human being and not just one of its components” (p.6).

The question of complexity, its recognition not as a problem to be solved in terms of the paradigms of the past, but rather as a different level of dealing with reality, is crucial to the new meaning of literacy as alluded to in, for instance, the *Hamburg Declaration on Adult Learning* and the *Agenda for the Future* adopted by the Fifth International Conference on Adult Education (CONFINTEA V) in July 1997. The Declaration (p.4) conceives of literacy broadly as “the basic knowledge and skills needed by all in a rapidly changing world.” It refers to such literacy as “a fundamental human right,” not only because it is “a necessary skill in itself,” but particularly as it is often “one of the foundations of other life skills.” The challenge to ensure that this human right can be asserted lies in more than the creation of the conditions of learning in the immediate sense. It will often mean, in the words of the Declaration, “the creation of preconditions for learning through awareness building and empowerment.” While this distinction reveals a conception of learning that is more limited than the one advocated in this chapter, the point is well taken that the societal responsibility to meet the basic learning needs of all throughout life entails much more than merely establishing educational facilities in the traditional sense of the word. It specifically

⁵ With regard to the limitations of Aristotelian logic, Edgar Morin, in an interview with Basarab Nicolescu, argues that “in all profound and important problems, whatever their particular domain, classical logic, the Aristotelian axioms, do not work. One is forced to have contradictory formulations in which the third is included” (see Badescu & Nicolescu, Eds., 1999, pp.51-52, my translation). Nicolescu (1999, p.3) identifies “multiple levels of reality; the logic of the included middle; and complexity” as the “three pillars of transdisciplinarity.”

also implies creating a social and human environment in which learning is seen to be ‘the right thing’ to do and appreciated as something that is aesthetically pleasing. In short, it requires a culture of learning to have evolved in society.

The *Agenda for the Future* (p.16), published in conjunction with the *Hamburg Declaration on Adult Learning* (1997), specifies that “everywhere in the world, literacy should be a gateway to fuller participation in social, cultural, political and economic life.” It must therefore be socio-economically and culturally relevant, allowing communities to “effect their own cultural and social transformations,” enabling women and men to “understand the interconnections between personal, local and global realities.” Connecting to personal experience, which involves body and mind together in an undivided way, implies naturally a sense of the complex, of the unity of knowledge, and of multiplicity of levels of reality. It requires strategies to facilitate learning that are radically different from much of current pedagogical practice (e.g. Lederman, 1999; Papert, 1993; Resnick, 1998; Resnick & Wilensky, 1998; Schank & Cleary, 1995; Schank & Cleave, 1995; Turkle & Papert, 1990; Wilensky, 1991).

In a sense, lifelong learning is a redundant notion. Any real learning cannot be but lifelong, as it involves the whole human being, i.e. all of one’s life. The main reason why we needed the term may be because common discourse has likened learning to schooling, and schooling, in the common conception, is seen as restricted to the school age. Earlier literature on lifelong learning, such as the report to UNESCO of the International Commission on the Development of Education, *Learning to be: The World of Education Today and Tomorrow* (Faure *et al.* 1972), therefore puts considerable emphasis on strategies to expand schooling, particularly through the

then available technologies⁶. At the same time the Faure report stressed the need for fundamental overhaul of education systems.

Since studies can no longer constitute a definitive ‘whole’...educational systems must be thought out afresh, in their entirety, as must our very conception of them. If all that has to be learned must be continually reinvented and renewed, then teaching becomes education and, more and more, learning. If learning involves all of one’s life, in the sense of both time-span and diversity, and all of society, including its social and economic as well as its educational resources, then we must go even further than the necessary overhaul of ‘education systems’ until we reach the stage of a learning society (p.xxxiii).

No doubt, much still remains to be achieved in terms of meeting the challenges set out in 1972 by the International Commission on the Development of Education under the chairmanship of Edgar Faure!

It sounds paradoxical, but education systems have the greatest difficulty to become learning systems. Their failure to recognize their often blatant inadequacy *vis-à-vis* the demands of our times, their conservatism and their high degree of inability to be even slightly perturbed by changes in the world around them is well known to innovative educators and has been referred to by authors quoted earlier in this chapter. Lederman (1999) refers to “the general failure of school reform movements” and “the awesome resistance of school systems to change.” Papert (1993, p.2) asks: “Why, through a period when so much human activity has been revolutionized, have we not seen comparable change in the way we help our children learn?” He notes that “the education establishment, including most of its research community, remains largely committed to

⁶ Typical is a paragraph like the following one in the Faure report: “The commission accordingly underlined the fact that despite doubts and differing orientations, and whatever the progress or savings which might be obtained from certain changes in the traditional educational system, the very heavy demand for education due on the one hand to the gradual prolongation of school-attendance to optimal age, and, on the other hand, to the institution of a genuine lifelong education, can only be met if instruments derived from modern technology, with its limitless possibilities, are put to use on an adequate scale and with appropriate means” (Faure *et al.*, 1972, p.xxxvi.).

the educational philosophy of the late nineteenth and early twentieth centuries” (p.3). Schank & Cleary (1995, p.ix) observe that, while “most six-year-olds can’t wait to go to school,...for an alarmingly large number of [them]...boredom, anxiety, and fear of learning quickly set in.” This frightening observation reverberates also in the words of Arno Penzias⁷ (cited in Visser, 1999b), who, during a video-delivered intervention at a symposium on *Un Siècle de Prix Nobel: Science et Humanisme*, held at UNESCO on 8, 9 and 10 April 1999, highlighted the necessity of ‘learning to learn.’ With knowledge now becoming obsolete various times in a lifetime, questioning one’s own assumptions has become crucial. Against that backdrop, Penzias noted the awesome situation that children, as soon as they go to school, cease to ask questions. What does it mean to be learning in the perspective of turbulent change and what Nicolescu (1999) calls the “tensions menacing life on our planet” (p.4)? What challenges lie ahead?

UNDEFINING LEARNING

Above I have argued that existing visions of learning are based on definitions, mostly implicitly stated, that delimit learning too narrowly to deal adequately with the issues raised in this chapter. It is thus necessary to first remove these constraints to the development of broader visions. To do so, I propose the following alternative definition of learning:

Human learning is the disposition of human beings, and of the social entities to which they pertain, to engage in continuous dialogue with the human, social, biological and physical environment, so as to generate intelligent behavior to interact constructively with change.

⁷ Co-discoverer, together with Wilson, of cosmic microwave background radiation, for which they shared a divided Nobel Prize in Physics in 1978.

The above definition was conceived to ‘undefine’ – i.e. to go beyond the limitations of – existing definitions of learning. It does not intend, however, to put another straightjacket around the notion of learning. Reference to the ‘human, social, biological and physical environment’ is based on commonly accepted ways to divide human knowledge up into these four major fields. In no way does the definition want to suggest that this is in all cases a preferred way of looking at the world. As argued elsewhere in this chapter, it is often necessary to transcend these artificial divisions in our knowledge system to develop useful insight in today’s problems and adequate behavior to deal with them intelligently.

The dispositional dimension in this definition is important. The cerebral and other bodily functions that accompany learning behavior will only be effectively engaged if the disposition is there. Defining learning in the first place as a disposition draws essential attention to the fundamental need to establish not only the conditions of learning, such as in the sense referred to by Gagné (1985), but particularly also what the Hamburg Declaration on Adult Learning (1997) calls the "preconditions for learning" (p.4). Creating a learning society thus becomes a process that leads individual and social entities to see themselves and think of themselves as continually learning entities.⁸

The disposition is deliberately qualified as pertaining to individual human beings *and* social entities. Individuals are not separate from their social context and there is no social organization without reference to individual identity. Individuals and social entities at different levels of organizational complexity all engage in learning. The learning ecology in which they are nested should provide the necessary conditions to create an effective and continual dialogic disposition

⁸ See in this connection e.g. Tuckett’s (1996) analysis of media use in Britain to raise the motivation to participate in learning opportunities among underrepresented adult audiences.

at all those different levels. Thus, the definition of learning proposed here is equally applicable to learning individuals as to learning organizations (Chawla & Renesch 1995; Marquardt 1996; Senge 1990), or learning cities (Jain & Jain 1999; Longworth in this handbook).

Emphasis in this definition is on the dialogic nature of learning. It takes learning out of the individual human brain – thus breaking with the preferred vision that underlies most of the schooling and training tradition. “Truth is not found inside the head of an individual person, it is born between people collectively searching for truth, in the process of their dialogic interaction” (Bakhtin 1984, p.110, cited in Shotter 1997). It can equally be found in the dialogic interaction between people and their biological or physical environment, as several millennia of history of scientific and technological development convincingly demonstrate.

More than ever is the evolutionary *raison-d'être* for human learning the presence of change in the environment. Change is not just a given in the environment, something to which one reacts, it is equally produced by every single living entity. This has always been so, but the impact we had on each other and on our shared human, social, biological and physical environment was far less a concern when some decades ago there were only three billion of us on this planet and it will be dramatically more of a concern a few decades from now. The requirement that interaction with change be constructive is therefore an ecological imperative. Without it, the human species will undermine the very basis of its own sustainability. The complexity of change patterns as we know them nowadays requires that we interact with change at multiple levels. This leads in turn to the need to similarly visualize learning at multiple levels of organizational complexity, ranging from the individual to society at large.

The above definition covers both intentional and unintentional learning. It encompasses not only such partial aspects of learning as the acquisition of particular skills, but it also allows us to visualize learning in a context in which constructive interaction with change has to do with complex issues such as learning to live together, both locally and globally; democratic participation in society; matters of war and peace (or constructive interaction with conflict); issues relating to the shared responsibility of humankind for the environment and the management of the earth's resources; demographic issues; and globalization, i.e. at a level at which the concept 'literacy' is in urgent need of acquiring new meanings. It equally encompasses those cases in which the process dimension of learning is more important than any particular product, such as when learning to learn or managing one's motivation to learn are the important issues, rather than acquiring a particular skill. Moreover, because of its comprehensive nature, the definition does not enter into conflict with more operational definitions such as the one by Hilgard (1948) referred to earlier in a footnote in this chapter. It simply deals with the issue of learning at a different level of reality.

The definition, as given, implies that learning is conceived of in an ecological perspective. Human beings and the social entities to which they pertain are themselves part of the human, social, biological and physical environment. Thus, constructive interaction with change implies action and reflexive communication across multiple levels of organizational complexity. Hawkins (1964, p.272), quoted in Allen & Otto (1996, p.202), refers to the capacity to learn as "an externalization of function," i.e. the ability of the living/learning entity to attain "thermodynamic efficiency" by exchanging information with the environment and using the environment as an opportunity to offload and share relevant portions of its information storage and processing needs. Unless learning is seen as a dialogic disposition, rather than a mere internal process, taking place within the brains of individuals, such opportunity to attain thermodynamic efficiency would be

missed. It is exactly this disposition that allows human beings to build environments that most effectively mediate learning and that optimize the thermodynamic efficiency, i.e. the constructive nature, of how they interact with change. It is in this sense, also, that Allen & Otto refer to media as “lived environments” (pp.199-225).

Learning systems, in the perspective of our definition, are essentially healthy living systems, i.e. systems that are able to continually maintain a *dynamic steady state*, a condition which, according to Lehninger (1965), “is a characteristic of all smoothly running machinery” (p.235), the steady state being “the *orderly* state of an open system” (p.235). It can be deduced that “when an open system is in a dynamic steady state, the rate of entropy production by the system is a minimum for the specific energy flows taking place” (pp.235-236). Conversely, deviation from the steady state leads to the production of entropy at a higher rate, i.e. thermodynamic inefficiency. Still according to Lehninger (p.236): “This important deduction has been commented on in the following words⁹:

This remarkable conclusion . . . sheds new light on ‘the wisdom of living organisms.’

Life is a constant struggle against the tendency to produce entropy by irreversible processes. The synthesis of large and information-rich macromolecules, the formation of intricately structured cells, the development of organization – all these are powerful anti-entropic forces. But since there is no possibility of escaping the entropic doom imposed on all natural phenomena under the Second Law of thermodynamics, living organisms choose the least evil – they produce entropy at a minimal rate by maintaining a steady state.

In the same vein, Allen & Otto (1996, p.203) cite Maturana (1978, p.45), who says that “...learning is not a process of accumulation of representations of the environment; it is a

⁹ The words are Aharon Katchalsky’s, according to my annotation of Lehninger’s text. They can be found in a paraphrased form in Katchalsky (1976/71). Lehninger himself makes no particular attribution.

continuous process of transformation of behavior through continuous change in the capacity of the nervous system to synthesize it.” They thus conclude that

behavior so informed by the environment represents a lowered entropy – that is, a greater orderliness of arrangement. Chaotic, disorganized, and arbitrary aspects of an organism’s activity are ameliorated by attention and intention directed towards aspects of the environment that are related to the organism’s ecological niche. The orderliness and organization of behavior that results from niche-related attention and intention can be characterized as intelligence. Such intelligence is thermodynamically efficient because it leverages the expenditure of small amounts of biological energy (Gibbs Free Energy) to guide much larger flows of energy in the external environment (p.203).

In the learning ecological perspective referred to in this chapter, learning entities function at different levels of organizational complexity. In the thermodynamic sense they are open systems, exchanging matter and energy with their environment and thus with each other. Learning and activity at a particular level and by a particular entity can therefore not be seen in isolation from what happens in the learning environment as a whole. Gibson’s notions of ‘affordances’ and ‘effectivities,’ proposed in the conceptual framework of ecological psychology (e.g. Allen & Otto 1996; Gibson 1979; Ryder & B. G. Wilson 1996), are relevant in this context. By becoming integrated components of an ecological whole, different learning entities, whether social or individual, constitute affordances (opportunities or potential for action) for each other. Through dialogic interaction these affordances lose their separateness and transform into effectivities (or capabilities for action). This is quite similar to the way in which Ryder & B. G. Wilson (1996, p.1) explain how initially “the hand of an infant, though attached, is a separate object. The infant is amused by it, studies it, tastes it, touches other things with it.” In time, however, “the infant learns to *use* the hand to manipulate other objects” and the hand “gradually transforms its object-ness to subject-ness” in the process of the child’s becoming “less conscious of the hand as she

uses it as an extension of her own intentioned will.” Thus, in the evolution of a truly integrated learning environment one should expect to see a similar integration of learning entities among themselves and across different levels of organizational complexity. The learning society is an organic whole rather than something organized through the agency of a centralized bureaucracy. While conditions in the learning environment can be planned, learning itself can not. The learning environment fosters learning; it does not plan it. Trying to do so would kill it.

The process of gradually increased organic integration of the learning environment, so necessary in our world of rapid change and increased complexity in which everything depends on everything, can be greatly helped along through media and technology, provided that media are perceived as ‘lived environments’ in the sense discussed by Allen & Otto (1996). It should be understood, these authors note, that “the extension of human cognitive capacity through media technologies reflects broader evolutionary trends characterized by increasing externalization of information storage and processing” (p.203). They propose the term *mediacy* to express the degree to which individuals are able to reduce the organic cost of cognition through externalization of information storage and processing.¹⁰ This notion should similarly apply to learning entities, whether individual or social, in general. Literacy, as we used to define it, is then a special case of mediacy (see also Ryder & B. G. Wilson 1996). Against the backdrop of our discussion of the organic integration of learning entities in a learning environment – of which other learning entities as well as a complex resource infrastructure, including the media, are equally part – it makes sense to expand Allen & Otto’s concept of mediacy to comprise in general the learning entity’s ability to maximize thermodynamic efficiency through externalization of

¹⁰ Allen & Otto recall in connection with their proposal of the term ‘mediacy’ Bruner and Olson’s (1977-78) definition of intelligence as ‘skill in a medium.’

information storage and processing involving *any* organic part of the learning ecology. This might then be called *dialogic efficacy*¹¹.

The development of dialogic efficacy is ultimately dependent on the existence of a *dialogic environment*, i.e. an environment in which the activity of learning is pervasive and in which it occurs in diverse contexts and at different levels of organizational complexity.¹² An environment in which learning is largely limited to the one-dimensional single-mode processes that characterize most of the traditional formal schooling context is antithetical to the development of dialogic efficacy. On the other hand, a truly organically integrated learning environment can only evolve if learning entities possess dialogic efficacy. This thus poses a classical chicken-and-egg problem, requiring a solution that neither favors the chicken nor the egg. It is therefore imperative to work at different levels simultaneously, developing dialogic efficacy as part of the concern to create the conditions for the evolution of an organically integrated learning environment.

MEETING THE BASIC LEARNING NEEDS OF ALL THROUGHOUT LIFE

Let us now return to the more practical question that we started off with at the beginning of this chapter, ‘What should be done to meet the basic learning needs of all throughout life?’ In line with the reasoning developed in the earlier part of this chapter, this question now needs to be reformulated as follows: ‘How can we create propitious conditions that will best ensure the evolution of an integral, complete and comprehensive learning environment?’ *Integrity* is

¹¹ By nature of the dialogic process, which involves both the self and the environment, the term ‘dialogic efficacy’ subsumes the presence of dialogic self-efficacy.

¹² Such an environment is made up of the kind of “distributed dynamical systems” that the Santa Fe Institute (1997) has identified as a focus area for research. These are “systems capable of complex, robust, open-ended learning and cognition” whose understanding “requires a framework in which intelligence is shared among multiple, possibly heterogeneous, agents interacting with each other and often with their environment.” For such distributed systems “the critical question is to understand the relation between local mechanisms and the learning process of the whole.”

important because of the need for all learning entities to be able to interact with each other. As argued above, such interaction is required for all learning systems, at whatever level of organizational complexity, to function as thermodynamically efficient open systems, fostering growth in such a way that they produce entropy only at a minimal rate (Katchalsky 1976/1971). A learning environment that lacks integrity will eventually become dysfunctional. *Completeness* refers to the requirement that the learning environment should accommodate all different purposes and modalities of learning and that it should do so in a way that they constitute a whole that is complete in itself. *Comprehensiveness* means that no one should be excluded from opportunities to learn and no learning need should be seen as alien to the learning environment.

The notion of what is ‘basic’ in ‘basic learning needs’ is not constant. It varies across different circumstances and over time. It develops as learning develops. It is thus a dynamic concept. The right to education, as laid down half a century ago in the *Universal Declaration of Human Rights*, refers in the first place to people’s right to effective schooling, to being functionally literate, and to having “access to the printed knowledge, new skills and technologies that could improve the quality of their lives and help them shape, and adapt to, social and cultural change,” as stated more than 40 years later in the preamble to the *World Declaration on Education for All* (1990, p.1). Article 1 of that Declaration specifies that

these needs comprise both essential learning tools (such as literacy, oral expression, numeracy, and problem solving) and the basic learning content (such as knowledge, skills, values, and attitudes) required by human beings to survive, to develop their full capacities, to live and work in dignity, to participate fully in development, to improve the quality of their lives, to make informed decisions, and continue learning (p.3).

It relates the satisfaction of these needs to empowerment; to the common responsibility to respect and develop the collective cultural, linguistic and spiritual heritage; and to our responsibility to care for the learning of our fellow human beings. It does so by referring to the need to foster

social justice; protection of the environment; tolerance; respect for humanistic values and human rights; and the cause of peace and solidarity in an interdependent world. It furthermore links the satisfaction of basic learning needs to the “transmission and enrichment of common cultural and moral values” (p.3) and asserts it as “the foundation for lifelong learning and human development” (p.3). Like the Faure report almost two decades earlier (Faure *et al.* 1972), the Declaration calls attention to the potential and opportunities offered by “the convergence of the increase in information and the unprecedented capacity to communicate” (p.4). This is seen as an important condition to develop “an ‘expanded vision’ that surpasses present resource levels, institutional structures, curricula, and conventional delivery systems while building on the best in current practices” (p.4).

The overall conception of the *World Declaration on Education for All* (1990) reveals a bias towards the school system as the centerpiece of the learning environment, without restricting itself to it. Indeed, the Declaration as well as the companion *Framework for Action to Meet Basic Learning Needs*, make reference to such non-school components as the family; the community; and institutional programs with regard to early childhood care and initial education. They equally suggest that the basic learning needs of youth and adults can be met “through a variety of delivery systems” (p.6) and mention in that context literacy programs; skills training programs; apprenticeships; and formal and non-formal programs in different areas of relevance for personal, community and socio-economic development. In addition, they call for the mobilization of “all available instruments and channels of information, communications, and social action...to help convey essential knowledge and inform and educate people on social issues” (p.6). The notion of integration – “these components should constitute an integrated system” (p.6) – is advocated as well. However, the language of the document, which emphasizes delivery, suggests that the term ‘integrated system’ should be interpreted as a system in which different mechanisms and

approaches are used in symphony, in a well-orchestrated way, to deliver the multiple goals set by the World Conference on Education for All, held in March 1999 in Jomtien, Thailand. Such a perspective is different from the one advocated in this chapter, which emphasizes an *organically* integrated learning environment, i.e. an environment in which the constituent “distributed dynamic [sub]systems can be viewed as decentralized networks of agents...evolving through interactions with each other and their environments” (Santa Fe Institute 1997), a vision which defies the notions of centralized planning, orchestration and delivery, requiring different modalities of social organization.

A major end-of-decade assessment of the achievements since Jomtien is currently being undertaken by UNESCO, on behalf of the International Consultative Forum on Education for All (Education for All, the Year 2000 Assessment, 1998). It follows an earlier mid-decade assessment (Education for All: Achieving the Goal, 1996), the results of which indicate on the one hand that much needed advances have been made, but that, on the other hand, those advances fall short of what is required. Basic statistics regarding literacy, school participation and successful school completion change quantitatively, but not qualitatively. Moreover, and more fundamentally, they do not usually reflect the extent to which the *totality* of diverse learning needs is being met. A different vision and a different rationale are required. Without losing sight of the importance of schooling, the concept needs to be fundamentally rethought, in conjunction with and balanced against other components of the learning environment at large, with specific attention to the organic integration of the whole. In the words of the *Amman Affirmation*, contained in the Final Report (Education for All: Achieving the Goal, 1996) of the Mid-Decade Meeting of the International Consultative Forum on Education for All:

Given the trend toward more open societies and global economies, we must emphasize the forms of learning and critical thinking that enable individuals to understand changing

environments, create new knowledge and shape their own destinies. We must respond to new challenges by promoting learning in all aspects of life, through all the institutions in society, in effect, creating environments in which living is learning (p.10).

MULTIPLICITY OF CHALLENGES

The challenge to rethink the learning landscape is formidable and multifaceted. I have selected four major component challenges for further analysis. They have to do with the school, with learning, with complex organization, and with the nature of knowledge. This choice is far from exhaustive. However, it should give a good feel for the extent of the task ahead. In the interest of clarity, I shall deal with each of them separately, even though they intersect with each other to a considerable extent. A certain redundancy in what follows can therefore not be avoided. It is important to note that the best way to take on a multiplicity of challenges is by recognizing their multiplicity. Therefore, while for analytical purposes the four selected challenges are treated below in separation of one another, the practical effort of recreating the learning landscape needs to be undertaken at the comprehensive level.

The School

The idea of school is in for a major overhaul. However, it won't change of its own accord. It will only change within the context, and as an integrated part, of an evolving overall learning ecology. School reform movements must thus broaden their focus to beyond the walls of the school. Most important is the challenge to rethink the school within the perspective of the whole. This implies attending to the role the school must play in preparing new generations of individuals and communities for their place in the evolving learning ecology. It also implies

rethinking the school as a nodal point of a transgenerational community of learners who, throughout their lives, continue to contribute to, and benefit from, the learning of others.

The concept ‘school,’ as referred to here, connotes more than the formal school system. It includes equally the various alternative pathways to learning whose basic underlying assumptions – as expressed in the acquisition/delivery metaphor and the treatment of knowledge as a commodity – are the same ones that underlie the formal school system. This holds true, for instance, for much of the distance education tradition. Reconceptualization of the school, then, challenges current notions of planning, organization and administration; the idea of the set curriculum; top-down pedagogical approaches; roles and expectations of the different actors in the school environment, such as expressed in the traditional dichotomy between teachers and learners; practices of assessment of learning achievement; and views of who in society is responsible for managing the learning environment. It furthermore challenges the implicit notions of spatial organization – both static and dynamic – and rigid timeframes that characterize the instructional processes employed in the school context.

Lastly, an important consideration is also the potential role of the reconceptualized school as a backbone of the learning ecology. Within that perspective, particular attention should be given to such basic functions as the creation, maintenance and development of literacy, mediacy, and dialogic efficacy; fostering the continual ability and motivation to learn; and facilitating the organic cohesion of the learning environment as a whole.

Learning

A second major challenge relates to the dialogic nature of learning and therefore to its essentially social character. This aspect finds clear expression in the notion of *learning to live together*, one of the four pillars – perhaps the most important one – on which, according to the 1996 report to UNESCO of the International Commission on Education for the Twenty-first

Century (Delors *et al.* 1996), learning throughout life should build. This important and overriding dimension of any successful learning experience has long gone unnoticed. Yet, without the full recognition of its essential importance, it will become increasingly difficult to deal with issues that reflect the complexity of our social and human interaction, the creative potential of our diversity, and the consequences of our collective interaction with the environment. Due to the dominance of the traditional schooling paradigm, learning was usually seen as something that is – and should be – done alone, a view that is perhaps most strongly expressed in how learning gains are being assessed. Even now when the social nature of learning is getting increased recognition, educators, as well as evaluation specialists, are often at a loss as to how to reconceptualize assessment practices accordingly. As a consequence, moving away from the old paradigm is hard. Whence the enormity of this challenge.

Complex Organization

Complex organization is the third major challenge to be considered. Relatively recent developments – expressed in such notions as the learning society, the learning district, the learning city, the learning organization, the learning family, or, more generally, the learning community – reveal an increased recognition that learning takes place at different levels of organizational complexity. In terms of the definition of learning proposed in this chapter, it means that one can recognize the disposition to generate intelligent behavior for constructive interaction with change as something that characterizes, to a greater or lesser extent, each of these levels of social organization. Some countries, cities, and families have grasped the importance and relevance of their own role in interacting constructively with change better than some others have. Interestingly, just as one can see individuals taking an interest in and feeling responsible for the learning of other individuals, one can see larger social entities do the same. This is, for instance, reflected in how nations collectively influence each other in the ways they deal with

conflict, or in how they persuade each other to behave responsibly in collectively managing the earth's resources. It can equally be seen in how they try to create agreed-upon collective patterns of behavior to control demographic growth or in how they convince each other to adopt and develop behavior in line with international agreements, such as those concerning the human genome.¹³ At lower levels of organizational complexity one sees it reflected in how existing learning cities mobilize other cities to also become learning cities, or in how the phenomenon of organizational learning spreads through the corporate world.

In addition to the interactions between learning communities at comparable levels of organizational complexity, there is also interaction across different levels of organizational complexity. A family that is a learning family motivates the learning behavior of individual family members and *vice versa*. Similarly, learning cities are propitious environments for stimulating learning at the corporate and local community level within such urban settings. Naturally, the school should also be seen as a learning community whose efficacy to be in constant dialogue with the community to which it pertains will depend on the extent to which that community is a learning community. It is because of these interdependencies that strategies to foster the evolution of an organically integrated learning environment should not limit themselves to isolated components.

The Nature of Knowledge

The fourth major challenge that I have chosen for further analysis has to do with the nature of knowledge itself. Societal processes of dealing with a vastly growing body of knowledge – growing both in extent and complexity – have, over time, led to increased

¹³ Typically, organizations like UNESCO should be seen, and they should see themselves as promoters and facilitators of learning at this level. Their interaction with the learning behavior of entire nations should also have profound implications for their own organizational learning behavior.

specialization. A tendency has thus emerged to deal with the complexity of the world by breaking it down into parts that, when dealt with in isolation, can be comprehended. This process has greatly contributed to the advancement of science. However, it has also led to a view of the world, and thus to ways of dealing with it, that are no longer able to account for its complexity. This is becoming unsettling as many of the problems the world is facing now fundamentally have to do with the phenomena of exploding change and rapidly increasing complexity referred to earlier. There is thus a need to overcome the shortcomings of the disciplinary structure of knowledge, moving beyond multidisciplinary and interdisciplinarity, to start seeing things in a transdisciplinary perspective. In short, we need to rediscover the unity of knowledge; we need to rediscover the relationship between action and learning.¹⁴

TOWARDS AN ORGANICALLY INTEGRATED LEARNING ENVIRONMENT

One vision, in line with the considerations developed in this chapter, has been under continuous construction since January 1996 in UNESCO, often collaboratively engaged in together with UNESCO's partners. It is known as Learning Without Frontiers,¹⁵ or LWF for short. The status and development dynamics of the program are extensively documented on the Learning Without Frontiers web site at <http://www.unesco.org/education/lwf/>.

¹⁴ Faure *et al.* made that argument already in 1972 (p.xxx) in critiquing the academic model. They considered that the academic model was “out of date and obsolete, not only so far as the working classes are concerned, but even in its utility to young people from the bourgeois class for which it was originally devised.” They noted particularly the arbitrariness of the academic model in isolating “the humanities (considered as non-scientific) from the sciences (considered as non-humanistic), and persistently...[failing] to recognize the advent of the ‘scientific humanities’.”

¹⁵ The name Learning Without Frontiers was originally suggested by the French philosopher Michel Serres in a proposal that became part of the advice of the ‘*Ad Hoc* Forum of Reflection on UNESCO’s role in the Last Decade of the Twentieth Century.’ The Forum was convened by UNESCO’s Executive Board in 1993. The Learning Without Frontiers program subsequently became operational in UNESCO in January 1996.

During the four years of its existence, LWF has functioned as a laboratory. Much of what is in this chapter is a reflection on the lessons learnt in that worldwide laboratory through work carried out in collaboration with governmental and non-governmental bodies, other United Nations agencies, private interest groups, civil society entities and the scientific community.¹⁶ It has focused on generating new ways of looking at learning, creating new policy frameworks, setting in motion new thought processes, and originating innovative practice. The dual focus on action and reflection has helped to ensure generating practice inspired by the latest knowledge available. It has also helped to put a reality check on the development of new conceptions and visions.

A major focus of LWF's work has been the organic integration of the learning environment, the desire to ensure that for every person, and for any community, learning would be a natural part of the make-up of human behavior and of society. To achieve integration of the learning environment, multiple barriers to learning must be broken down or at least diminished. I shall conclude this chapter with a brief discussion of a selection of those barriers.

NEW DIRECTIONS: CROSSING BARRIERS¹⁷

Moving beyond the constraints of existing organizational modalities

Any significant development towards attending to learning needs in a comprehensive and integrated fashion will depend on the political will and creative imagination of a society working together across sectoral boundaries and developing modalities of governance accordingly.

¹⁶ LWF's work has involved countries such as the nine so-called high-population countries (Bangladesh, Brazil, China, Egypt, Mexico, Nigeria, India, Indonesia, and Pakistan, who together make up half of the world's population), and a variety of other countries, such as those of Central America as well as Colombia, Morocco, Mozambique, Turkey, the USA, and Zimbabwe, to name but a number of them).

¹⁷ Part of this section is based on the author's contribution to a report by Klees, Matangala, Spronk, & Visser (1997).

Learning should be the shared interest of governmental bodies whose responsibilities lie in a multitude of areas such as education; communication; labor; agriculture; health; culture; social welfare; youth; tourism; and the environment. A ministry or department of education is a significant player in that context, but not an exclusive one. Similarly, responsibilities and interests at the national level are shared with those of non-governmental bodies, the private sector, and civil society institutions. They reflect modalities of social organization and governance that are functionally distinct and represent diverse levels of organizational complexity. Multiple partnerships are necessary to forge them into an organically consistent whole. Particular bodies, preferably working at a level that can be widely recognized as being impartial *vis-à-vis* the interests of particular stakeholders, can play a helpful role in promoting and facilitating this process. The difficulty to create such bodies, or for existing ones to give up their historically acquired positions, is merely indicative of the extent of the challenge. It should not be an excuse for not pursuing the goal.

*Learning across multiple channels*¹⁸

Advances towards the establishment of an organically integrated learning environment will be hampered by a vision that puts emphasis on formal learning and treats non-formal and informal learning as separate and of a lesser category. In fact, even the conceptual distinction between these three domains – or any other subdivision for that matter¹⁹ – may not be all that helpful. Integration of the learning environment will be equally hampered by the failure to recognize learning that takes place via different communication media, such as radio, TV,

¹⁸ Also referred to as *multichannel learning* (see e.g. Anzalone, Ed, 1995).

¹⁹ Hallak (1990), in a book written to coincide with the development dynamics put in place by the World Conference on Education for All, lumps non-formal education (NFE) and informal learning together and then subdivides it into paraformal education, popular education, education for personal improvement, and professional or vocational NFE, attributing different levels of importance to each as a function of who takes care of it. The different proposed categories have the formal system as their reference point.

computers, puppet shows, popular theatre and dance. Similar constraints result from the non-recognition of learning that is grounded in the use of symbol systems requiring literacies different from the ones based on the Western alphanumeric symbol system and the almost exclusive use of the written word as a means to create representations of reality. The overemphasis on formal learning is particularly problematic in the context of developing countries where it results in undervaluing the importance and relevance of existing alternatives. Anzalone (1995, p.9), while referring to the situation in most developing countries, thus expresses concern about the lack of available options. “One usually finds few paths to learning [and] time is spent locked into the routines of copying text..., listening to teachers’ verbal renditions of information, and reciting and memorizing text from the blackboard or textbooks.” He recommends a process that “begins by looking at learners and their connections with bodies of knowledge, information and skills, and a commitment to build upon what currently exists,” and that “then looks at how in a value-added fashion learning could be strengthened by using more and varied learning channels to open up and animate the learning process.” We must thus move beyond the conception of the learning process as something activated and maintained by a single channel, a single path to learning. The “expanded vision,” called for in the World Declaration on Education for All (1990, p.4) and referred to earlier in this chapter, is important in this context. However, contrary to most of the post-Jomtien practice, it needs to be developed with multiple reference points in mind.

Crossing boundaries between the worlds of work and learning...and beyond

The traditional philosophy underlying the school system is quite closely related to the connection between learning and work, in that order. The learning that members of a new generation engage in when they go to school is seen, to a large extent, as what prepares them for the world of work. The extent to which they progress in the school system will reflect forward on their future status in the world of work. Not so long ago that connection could claim to have a

certain validity. That validity is becoming challenged in various ways. First of all, many young people, both in the industrialized and the developing world, are painfully discovering that their successful academic careers are insufficient to obtain a job. Often what they have learnt is also irrelevant as a basis for self-employment. Second, the relationship between learning and work is becoming less and less linear and unidirectional. The work environment is often also an excellent learning environment, sometimes more effective than the school, and many a good school would integrate work in its procedures to facilitate and motivate learning. More importantly, and this is a third point, the world of work itself is changing, just as much as the world of learning changes (see e.g. Britton 1994; Handy 1995; Rifkin 1995). Brown & Brown (1994) refer to a variety of authors, including Buckminster Fuller and McLuhan & Leonard, who already decades ago stressed that learning would become the major occupation of the future, rather than work. They particularly point to distance education as a modality to facilitate learning in a flexible and open manner in a world in which work and learning become more and more intertwined, in which work is not the equivalent of 'having a job,' and in which learning may inspire work as well as be inspired by it or be undertaken for purposes unrelated to the world of work, i.e. for its own intrinsic sake. It is thus necessary to create facilitating infrastructure for learning that allows learning communities to establish themselves around a flexible range of issues of common concern to their members.

Bridging the gap between 'modern' and 'traditional' systems of knowledge and learning

Opportunities are missed if, in a community, different systems of knowledge and learning operate without being allowed or encouraged to interact with each other. In most societies, school-based learning is seen as inherently superior to and separate from any other modality of learning. Similarly, the multiplicity of learning contexts notwithstanding, knowledge acquired in the school context is often the only kind of knowledge for which formal accreditation can be

obtained. The terms ‘modern’ and ‘traditional,’ though often used in this context, are unfortunate and misleading. Taken at their face value, and given the choice, one is inclined to opt for ‘modern’ rather than ‘traditional’ learning. However, there is no reason to assume that school systems are less stagnant and devoid of evolution than what is suggested by some of the connotations of the term ‘traditional’. What is required is simply an open eye for the opportunities contained in any system of learning, whatever its designation, and a facilitating environment that allows learning communities to co-evolve. It is of great concern in this regard that information about learning and knowledge systems other than the school system is largely lacking.

Overcoming the language barrier

A great variety of languages is spoken around the world. Some continents, such as Africa, are particularly rich in linguistic diversity. The formal schooling systems tend to view this as a problem, particularly when linguistic diversity occurs within one single national system. It limits the possibility to mass-produce instructional materials and to easily assign teachers to different linguistic regions within a country. It is thus a significant cost factor when considered against the backdrop of the established schooling practice. Linguistic diversity, however, is as crucially important for the evolution of knowledge and thought as is biodiversity for the evolution of the species.

Given the above consideration, the rate at which languages are disappearing in the world is frightening (see also Visser, 1997). Pinker (1994, pp.259-260) asserts that, at a global level, “between 3600 and 5400 languages, as much as 90% of the world’s total, are threatened with extinction in the next century.” He mentions as causes “the destruction of the habitats of their speakers,...forced assimilation and assimilatory education.” The recognition of the importance of linguistic diversity is often at a tension with political motives to promote national unity through

the use of a single language. Nonetheless, it is thus important to create learning environments that are able to accommodate and foster linguistic diversity. There are different contexts in which this is particularly relevant in different ways. I shall mention three of them.

In the first place there is the case of countries where different languages are spoken in one national territory. Many of them are so-called developing nations. Many of them are in Africa. Their geopolitical borders were drawn up in colonial times, without regard for the ethnic and linguistic divisions within and across them. When such countries became independent, the use of the former colonizer's language for official communication and as language of instruction was often considered an important condition to forge national unity. Neocolonial interests, the countries' dependence on foreign aid, the convenience to strengthen ties with countries belonging to the same linguistic zone, and lack of resources in general, have further reinforced the practice to use a borrowed language as a major or exclusive vehicle for formal learning. The formal learning context having its well-known attributed importance, this has had a profound influence on the learning environment at large. The problem is exacerbated as mastery of these borrowed languages is often weak. As a result, conceptual development in them is disconnected from the emotional world of learners, as expressed in their mother tongue. This problem occurs perhaps most blatantly in Africa, however it equally applies to those countries, for instance in parts of Latin America, where a majority language wipes out any collective attention to cognition in a minority language.

The second case is that of the world at large. Recent tendencies towards greater interconnectedness across the globe, and in general the need to deal with problems that affect the planet or humanity as a whole, make it increasingly necessary to be able to communicate with each other. At a global level, the English language has acquired the status of *lingua franca*,

leading to the perception, particularly among native speakers of other languages, that those who were born to speak English have an unfair advantage. That, in turn, has sometimes resulted in politically motivated practices to establish parallel communications in different languages, which would typically include some of the major colonial languages of the past.

The third case is that of media with global coverage, particularly the Internet and satellite communication media. This case is, in fact, a particular instance of global communication as discussed in the previous paragraph. Technology being so powerful and potentially penetrating at a wide range of different levels in society, it is likely to have an unprecedented impact. There is thus a genuine concern that the predominant use of one or only a few languages in these media environments could endanger our cultural and linguistic diversity.

Concerning all three cases discussed above, and possibly many more that may be proposed for analysis, I suggest that the best way to deal with them goes beyond the practice of parallel communication in different languages. The world of today requires *translingual* dialogic efficacy, i.e. the capacity to participate in social cognition beyond and across language barriers. The cultural history of many European countries – for instance the Scandinavian ones and The Netherlands – shows quite convincingly that the expectation that any citizen be conversant, in addition to her or his mother tongue, in a variety of other languages does not at all lead to loss of identity or the disappearance of one's own culture. Quite to the contrary, it enriches the mind and contributes to tolerance of ambiguity. Moreover, it is an essential requirement to achieve integration of the learning environment at a translingual level, i.e. in a perspective that is essential for constructive interaction with change of a global nature and in the context of processes that involve different countries or linguistic communities. One of the important functions of preparatory learning therefore is the development of translingual dialogic efficacy. The school

has a role to play in this area, but so have the media and, in some cases, the family environment. A focus on this function turns linguistic diversity from a problem to be coped with into an opportunity to be explored.

The challenges of space, time and age

Learning used to be conceived of in terms of rather rigid spatial, temporal and age-related parameters. Reconceptualizing the learning environment thus calls for the removal of the conceptual constraints inherent in these factors and for practical solutions to overcome them. While much can be written about each of these issues separately, I am taking them together here in the interest of brevity.

The development of distance education has contributed much to overcoming the barriers to learning imposed by space, time and age. The literature on the development of the field is vast (e.g. Bates 1995; Moore & Kearsley 1996; Rowntree 1992; Willis, Ed., 1994). In a world in which the conventional schooling model sets the tone for anything considered worthy of the name 'learning,' much effort has gone into validating distance education against the standards of formal schooling. The field has successfully made the point and few people doubt any longer the validity and effectiveness of the instructional processes that pertain to the area of distance education.

However, the need to establish its validity in terms of the criteria of the formal schooling model has also led distance education to remain conceptually very close to the formal system (e.g. Visser, Jain, Anzalone & Naidoo 1997). Many distance education systems simply replicate the school model, keeping everything the same to the maximum extent possible, with the exception of the separation between the source of teaching and the learner. This is unfortunate. Much can be gained from efforts to think anew about the elements that make up the learning environment and

from finding more creative ways to combine different ingredients, procedures and contexts. Distance education can thus learn much from developments in such fields as the traditional school context, organizational learning, home-based learning, learning in the media environment, community education and learning cities. It can also itself contribute to these fields. For this to happen there must be a much more effective cross-fertilization among the professional communities active in these various fields. In other words, professional communities must become learning communities, and such communities are by necessity open.

Reconsidering the traditional conceptions, often preconceptions and sometimes misconceptions, regarding space, time and age is not the exclusive prerogative of the distance education community. Anyone involved in learning, i.e. every human being, should be aware of the different timeframes and spatial contexts in which we operate and learn at the same time. We should acquire an enhanced sensitivity as to how such timeframes and spatial contexts relate to our own lifespan²⁰, how we interact with members of other generations whose lifespan overlaps with our own, and how they relate to our place in history as well as in the evolution of the human species, the living world in general, and the larger universe.

Instructional practice still has a dominant influence on how we perceive learning. We must therefore overcome the narrowness of its spatial and temporal connotations. It is thus useful to distinguish between learning timeframes and validity timeframes. In the instructional context, learning timeframes are typically those whose order of magnitude ranges from one hour (i.e. 10^0 hours, the lesson period), via 10^3 hours (a term), to 10^4 hours (the duration of an entire instructional program, such as in the school context). Their associated validity timeframes, related to how long what has been learned can effectively and relevantly be used, may have an order of

²⁰ I use the term 'lifespan' here to refer to both space and time.

magnitude of anywhere between a week and a significant portion of a lifetime, i.e. ranging from 10^2 hours to 10^5 hours. However, some of our more significant learning experiences, usually unrelated to instruction, may have happened in a split-second and have a lasting impact on us, and on those who share our lives, such as our family, for generations to come. On the other hand, some of the wisdom handed down over historical or over evolutionary periods of time may largely leave us untouched, except, perhaps, for an ephemeral, but crucial moment during our life. That's learning.

It is thus necessary to conceive of this enormous variability of timeframes in relation to similarly varied spatial contexts, not only in a static sense, but equally dynamically conceived. Whoever may have come up with the idea that learning can best be done by sitting still was wrong. Certainly, it wasn't the ancient Greeks whose learning processes took place in the *peripatos*, or covered walkway of the Lyceum. And any parent who has ever gone out with their child for a walk will know better as well.

Perhaps, then, the most powerful means of giving learning new meanings will be by taking our mind for a walk and letting it experience the vastness of the landscape and the awesome extent of how it relates us to who we are, where we come from and where we are going.

REFERENCES

- Allen, B. S. & Otto, R. G. (1996), "Media as lived environments: The ecological psychology of educational technology" in Handbook of research for educational communications and technology, (Ed.) D. H. Jonassen, Simon and Schuster Macmillan, New York, NY, pp199-225.
- Anzalone, S. (1995), "The case for multichannel learning" in S. Anzalone (Ed.), Multichannel learning: Connecting all to education (ed.) S. Anzalone, Education Development Center, Washington, DC, p.1-12.

- Badescu, H. & Nicolescu, B. (1999), Stéphane Lupasco: L'homme et l'oeuvre, Éditions du Rocher, Série 'Transdisciplinarité,' Paris, France.
- Bakhtin, M. M. (1986), Problems in Dostoevsky's poetics, edited and translated by C. Emerson, University of Minnesota Press, Minneapolis, Minn.
- Bates, A. (1995), Technology, open learning, and distance education, Routledge, London, UK.
- Britton, F. E. K. (1994), Rethinking work: New ways to work in an information society, European Commission Publications Office, Luxemburg, Luxemburg.
- Brown, F. B. & Brown, Y. (1994), "Distance education around the world" in Distance education: Strategies and tools (ed.) B. Willis, Educational Technology Publications, Englewood Cliffs, NJ, p3-39.
- Bruner, J. S. & Olson, D. R. (1977-78), "Symbols and texts as tools for the intellect", Interchange 8 pp1-15.
- Burnett, R. (1999), The radical impossibility of teaching, paper presented at the International Symposium on 'New Roles of the School in a Changing Learning Environment' organized by the *Forum International des Sciences Humaines* at the *Università Cattolica del Sacro Cuore*, Brescia, Italy, March 18-20, 1999. Online. Available <http://www.eciad.bc.ca/~rburnett/rad.html> [1999, September 1].
- Chawla, S. & Renesch, J. (Eds.) (1995), Learning organizations: Developing cultures for tomorrow's workplace, Productivity Press, Portland, Oregon.
- Clarke, A. C. (1992), How the world was one: Beyond the global village, Victor Gollancz Ltd., London, UK.
- Delors, J. *et al.* (1996), Learning: the Treasure Within. Report to UNESCO of the International Commission on Education for the Twenty-first Century, UNESCO, Paris, France.
- De Vaney, A. & Butler, R. P. (1996), "Voices of the founders: Early discourses in educational technology" in Handbook of research for educational communications and technology, (Ed.) D. H. Jonassen, Simon and Schuster Macmillan, New York, NY, pp3-45.
- Dills, C. R. & Romiszowski, A. J. (Eds.) (1997), Instructional development paradigms, Educational Technology Publications, Inc., Englewood Cliffs, NJ.
- Driscoll, M. P. (2000), Psychology of learning for instruction, Allyn & Bacon, Needham Heights, MA.
- Duffy, T. M. & Jonassen, D. H., "Constructivism: New implications for instructional technology?" Educational Technology, 31 (5) pp7-12.
- Education for All: Achieving the Goal (1996), a series of three documents – "Final Report;" "Statistical Document;" and "Working Document" – emanating from the Mid-Decade Meeting of the International Consultative Forum on Education for All, held June 16-19,

- 1996, Amman, Jordan and published, for the International Consultative Forum on Education for All, by UNESCO, Paris, France.
- Education for All: The Year 2000 Assessment (1998), “General Guidelines” and “Technical Guidelines” published, for the International Consultative Forum on Education for All, by UNESCO, Paris, France.
- Faure, E. *et al.* (1972), Learning to be: The world of education today and tomorrow. Report to UNESCO of the International Commission on the Development of Education, UNESCO, Paris, France.
- Felman, S. (1982), “Psychoanalysis and education: Teaching terminable and interminable,” Yale French Studies, 63 pp21-41.
- Gagné, R. M. (1985), The conditions of learning, Holt, Rinehart and Winston, New York, NY.
- Gibson, J. J. (1979), The ecological approach to visual perception, Houghton Mifflin, Boston, MA.
- Grabinger, R. S. (1996), “Rich environments for active learning” in Handbook of research for educational communications and technology, (Ed.) D. H. Jonassen, Simon and Schuster Macmillan, New York, NY, pp665-692.
- Greeno, J. G. (1997), “On claims that answer the wrong questions”, Educational Researcher 26 (1) pp5-17.
- Hallak, J. (1990), Investing in the future: Setting educational priorities in the developing world, co-published by the International Institute for Educational Planning, UNESCO, Paris, France, and Pergamon Press, Oxford, UK.
- Hamburg Declaration on Adult Learning and Agenda for the Future (1997) adopted by the Fifth International Conference on Adult Education (CONFINTEA V), held in Hamburg, Germany, July 14-18, 1997, UNESCO-Institute for Education, Hamburg, Germany. Also Online. Available <http://www.unesco.org/education/uie/confintea/documents.html/> [1999, July 27].
- Handy, C. (1995), Beyond certainty: The changing worlds of organizations, Harvard Business School Press, Boston, MA.
- Hannafin, M., Land, S. & Oliver, K. (1999), “Open learning environments: Foundations, methods, and models” in Instructional-Design Theories and Models (Ed.) C. M. Reigeluth, Lawrence Erlbaum Associates, Publishers, Mahwah, NJ, pp115-140.
- Hawkins, D. (1964), The language of nature: An essay in the philosophy of science, Freeman, San Francisco, CA.
- Hilgard, E. R. (1948), Unconscious processes and man’s rationality. Urbana, IL (as quoted in De Vaney and Butler, 1996).

- Jain, V. & Jain, M. (1999), Udaipur as a learning city, draft project concept paper, Shikshantar: The Peoples' Institute for Rethinking Education and Development, Udaipur, Rajasthan, India. Online. Available <http://www.unesco.org/education/educprog/lwf/dl/udaipur.pdf> [1999, August 12].
- Jonassen, D. H. (Ed.) (1996), Handbook of research for educational communications and technology, Simon and Schuster Macmillan, New York, NY.
- Jonassen, D. H. (1999), "Designing constructivist learning environments" in Instructional-Design Theories and Models (Ed.) C. M. Reigeluth, Lawrence Erlbaum Associates, Publishers, Mahwah, NJ, pp215-239.
- Jonassen, D. H. & Rohrer-Murphy, L. (1999), "Activity theory as a framework for designing constructivist learning environments", Educational Technology Research and Development 47 (1) pp61-79.
- Katchalsky, A. (1976), "Thermodynamics of flow and biological organization" in Biophysics and other topics: Selected papers, A. Katzir-Katchalsky, Academic Press, Inc., New York, NY, pp521-547 (originally published in 1971 in Zygon: J. Relig. Sci (6) pp99-125).
- Klees, S., Matangala, A., Spronk, B. & Visser, J. (1997), Reaching unreached learners in Mozambique: A report to the Minister of Education on learning needs and alternative pathways to learning in the perspective of an integrated response to the needs of a rapidly developing society in a complex world. Online. Available http://www.unesco.org/education/educprog/lwf/dl/moz97_11.pdf [1999, September 1].
- Koestler, A. (1989, originally published in 1967). The ghost in the machine, The Penguin Group, London, UK.
- Learning Without Frontiers web site. Online. Available <http://www.unesco.org/education/lwf/> [1999, August 21].
- Lederman, L. M. (1999), "A science way of thinking: How to keep curricular reforms from becoming 'this year's new thing'", Education Week, 18 (40), June 16, 1999.
- Lehninger, A. L. (1965), Bioenergetics: The molecular basis of biological energy transformations, W. A. Benjamin, Inc., New York, NY.
- Marquardt, M. J. (1996), Building the learning organization, McGraw Hill, New York, NY.
- Maturana, H. R. (1978), "Biology of language: The epistemology of reality" in Psychology and biology of language and thought: Essays in honor of Eric Lenneberg, Academic, New York, NY (cited in Allen & Otto 1996).
- McAnany, E. G. (1978), Success or failure of communication technology in the Third World: By what criteria should we judge? Paper prepared for the conference "Economic Analysis for Educational Technology Decisions," Dijon, France, June 19-23, 1978.

- McVey, G. F. (1996), "Ergonomics and the learning environment" in Handbook of research for educational communications and technology, (Ed.) D. H. Jonassen, Simon and Schuster Macmillan, New York, NY, pp1045-1104.
- Moore, M. G. & Kearsely, G. (1996), Distance education: A systems view, Wadsworth Publishing Company, Belmont, CA.
- Nicolescu, B. (1999), The transdisciplinary evolution of learning, paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada, April 19-23, 1999. Online. Available <http://www.learndev.org> [1999, July 27].
- O'Connor, M. C. (1998), "Can we trace the 'efficacy of social constructivism'?" Review of Research in Education, 23 pp25-71.
- Pais, A. (1997), A tale of two continents: A physicist's life in a turbulent world, Princeton University Press, Princeton, NJ.
- Papert, S. (1993), The children's machine: Rethinking school in the age of the computer, Basic Books, New York, NY.
- Reigeluth, C. M. (Ed.) (1999), Instructional-design theories and models: A new paradigm of instructional theory, Lawrence Erlbaum Associates, Publishers, Mahwah, NJ.
- Resnick, M. (1998), "Technologies for lifelong kindergarten", Educational Technology Research and Development 46 (4) pp43-55.
- Resnick, M. & Wilensky, U. (1998), "Diving into complexity: Developing probabilistic decentralized thinking through role-playing activities", Journal of the Learning Sciences 7 (2) pp153-172.
- Rifkin, J. (1995), The end of work: The decline of the global labor force and the dawn of the post-market era, G. P. Putnam's Sons, New York, NY.
- Rowntree, D. (1992), Exploring open and distance learning, Kogan Page, London, UK.
- Ryder, M. & Wilson, B. G. (1996), Affordances and constraints of the Internet for learning and instruction, paper presented at the Annual Convention of the Association for Educational Communications and Technology, Indianapolis, Ind., February 14-18, 1996. Online. Available http://www.cudenver.edu/~mryder/aect_96.html [August 9, 1999].
- Sakaiya, T. (1991), The knowledge-value revolution, or, a history of the future, Kodansha International Ltd., Tokyo, Japan, originally published in 1985 in Japanese by PHP Kenkyujo, Kyoto, Japan as Chika kakumei.
- Salomon, G. & Perkins, D. (1998), "Individual and social aspects of learning", Review of Research in Education, 23 pp1-24.
- Santa Fe Institute (1997), SFI research focus area: Distributed learning. Online. Available <http://www.santafe.edu/sfi/research/focus/dlfocus.html> [1999, August 21].

- Schank, R. C. & Cleave, J. B. (1995), "Natural learning, natural teaching: Changing human memory" in The mind, the brain, and complex adaptive systems (Eds) H. J. Morowitz and J. L. Singer, Addison-Wesley Publishing Company, Reading, MA, pp175-202.
- Schank, R. C. & Cleary, C. (1995), Engines for education, Lawrence Erlbaum Associates, Publishers, Hillsdale, NJ. Also Online. Available http://www.ils.nwu.edu/~e_for_e/ [July 30, 1999].
- Senge, P. M. (1990), The fifth discipline: The art and practice of the learning organization, Doubleday, New York, NY.
- Sfard, A. (1998), "On two metaphors for learning and the dangers of choosing just one", Educational Researcher, 27 (2) pp4-13.
- Shotter, J. (1997), "The social construction of our 'inner' lives", Journal of Constructivist Psychology, 10, pp.7-24. Also Online. Available <http://www.massey.ac.nz/~ALock/virtual/inner.htm> [1999, March 16].
- Tessmer, M. & Richey, R. C. (1997), "The role of context in learning and instructional design", Educational Technology Research and Development 45 (2) pp85-115.
- Tuckett, A. (1996), "Adults and the learning society: Motivation and the role of the media" in Lifelong learning in the information society: Combatting exclusions through new technologies of learning, Conference proceedings of the International Symposium on 'Lifelong learning in the information society: Combatting exclusions through new technologies of learning' held in Valladolid, Spain, September 26-28, 1996, Forum International des Sciences Humaines, Paris, France, p127-139.
- Tudge, C. (1998), Neanderthals, bandits and farmers: How agriculture really began, Weidenfeld & Nicholson, London, UK.
- Turkle, S. & Papert, S. (1990), "Epistemological pluralism", Signs 16 (1) pp128-157.
- Vanderkam, L. R. (1999), "Forget the year-2000 (Y2K) computer virus - it's the Y6B population problem that has demographers worried", The Washington Times, July 13, 1999. Online. Available <http://www.y6b.org/wtimes.php3> [1999, July 23].
- Visser, J. (1997), "Multilingualism in a pervasive learning environment" in Le plurilinguisme dans la société de l'information, Conference proceedings of the Colloque International sur 'Le Plurilinguisme dans la Société de l'Information,' held at UNESCO, Paris, December 4-6, 1997, Forum International des Sciences Humaines, Paris, France, p133-148. Also Online. Available <http://www.unesco.org/education/educprog/lwf/doc/multi.html> [1999, September 1]
- Visser, J. (1999a), Overcoming the underdevelopment of learning: A transdisciplinary view, paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada, April 19-23, 1999 (Introductory paper to the Symposium on Overcoming the Underdevelopment of Learning). Online. Available <http://www.learndev.org> [1999, July 27].

- Visser, J. (1999b), Learning together in an environment of shared resources: Challenges on the horizon of the year 2020, essay contributed to the preparation by UNESCO of the report "UNESCO: Horizon 2020." Online. Available <http://www.unesco.org/education/educprog/lwf/dl/learning2020.pdf> [1999, September 6].
- Visser, J. & Berg, D. (1999), "Learning without frontiers: Building integrated responses to diverse learning needs", Educational Technology Research and Development, 47 (3). Also Online. Available <http://www.learndev.org> [1999, July 27].
- Visser J. & Buendia Gomez, M. (1989), The application of instructional technology in 'impossible' circumstances: The case of Mozambique. Paper presented at the Annual Convention of the Association for Educational Communications and Technology, Dallas, Texas, February 1-5, 1989.
- Visser, J., Jain, M., Anzalone, S. & Naidoo, G. (1997), "Learning without frontiers: Beyond open and distance learning." Collection of papers presented at the 18th ICDE World Conference, Pennsylvania State University, June 2-6, 1997, published in The new learning environment: A global perspective, The Pennsylvania State University, University Park, PA. Also Online. Available <http://www.unesco.org/education/educprog/lwf/doc/icde/icde.html> [1999, September 5].
- Waldrop, M. M. (1992), Complexity: The emerging science at the edge of order and chaos, Simon and Schuster, New York, NY.
- Wilensky, U. (1991), "Abstract meditations on the concrete and concrete implications for mathematics education" in Constructionism (Eds) I. Harel and S. Papert, Ablex Publishing, Norwood, NJ. Also Online. Available <http://www.ccl.tufts.edu/cm/papers/concrete/> [1999, September 23].
- Willis, B. (Ed.) (1994), Distance education: Strategies and tools, Educational Technology Publications, Englewood Cliffs, NJ
- Wilson, B. G. (1995), "Metaphors for instruction: Why we talk about learning environments", Educational Technology, 35 (5), 25-30.
- Wilson, O. E. (1998), Consilience: The unity of knowledge, Alfred A. Knopf, New York, NY.
- World Declaration on Education for All and Framework for Action to Meet Basic Learning Needs (1990), adopted by the World Conference on Education for All: Meeting Basic Learning Needs, held in Jomtien, Thailand, March 5-9, 1990, UNESCO (for the Secretariat of the International Consultative Forum on Education for All), Paris, France.