

## ***LIFELONG LEARNING AND ITS SUPPORT WITH NEW MEDIA***

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### **Abstract**

Lifelong learning is an essential challenge for inventing the future of our societies; it is a necessity rather than a possibility or a luxury to be considered. Lifelong learning is more than adult education or training — it is a mindset and a habit for people to acquire. It creates the challenge to understand, explore, and support new dimensions of learning such as: (1) self-directed learning, (2) learning on demand, (3) informal learning, and (4) organizational learning.

Lifelong learning requires a deeper understanding of the co-evolutionary processes between fundamental human activities and their relationships with new media. It requires an integration of new theories, innovative systems, practices, and assessment. New intellectual spaces, physical spaces, organizational forms, and reward structures need to be created to make lifelong learning an important part of human life. These new spaces and structures must support individuals, groups, and organizations who will engage in and experience them as innovators and risk takers, and will use their creativity and imagination to explore alternative ways of learning.

### **Introduction**

Learning needs to be examined across the lifespan because traditional notions of a divided lifetime—education followed by work—are no longer tenable [Gardner, 1991]. Professional activity has become so knowledge-intensive and fluid in content that learning has become an integral and irremovable part of work activities. Learning is a new form of labor, and working often is (and needs to be) a collaborative effort among colleagues and peers. In the emerging information society, an educated person will be someone who is willing and able to consider learning as a lifelong process. More and more knowledge, especially advanced knowledge, is acquired well past the age of formal schooling, and in many situations through educational processes that do not center on traditional schools [Illich, 1971]. Lifelong learning is more than adult education, which often is restricted to providing people with opportunities to engage in (school-like) learning activities during their adult life. The challenge for lifelong learning is to fundamentally rethink learning, teaching, and education for the information age in an attempt to change mindsets. It involves and engages learners of all ages in acquiring and applying knowledge and skills in the context of authentic, self-directed problems, and it exploits the possibilities offered by new media.

Lifelong learning has emerged as one of the major challenges for the worldwide knowledge society of the future. A variety of recent events supports this claim: (1) 1996 was the “European Year of Lifelong Learning,” (2) UNESCO has included “Lifetime Education” as one of the key issues in its planning, and (3) the G7/G8 group of countries has named “Lifelong Learning” as a

main strategy in the fight against unemployment. Despite this great interest, there are few encompassing efforts to tackle the problem in a coherent way. Lifelong learning is comprehensive; it cannot be investigated in isolation by looking just at one small part of it, such as K-12 education, university education, or worker re-education.

## Problems in the Information Age

**Lack of creativity and innovation.** Societies and countries of the future will be successful not “because their people work harder, but because they work smarter.” Creativity and innovation are considered essential capabilities for working smarter in knowledge societies [Drucker, 1994]; thus an important challenge is how these capabilities can be learned and practiced. An implicit assumption is made that self-directed and lifelong learning can influence the creativity and innovation potential of individuals, groups, organizations, and countries [Dohmen, 1999].

**Coping with change.** Most people see schooling as a period of their lives that prepares them for work in a profession or for a change of career. This view has not enabled people to cope well with the new realities of our world that (1) most people change careers several times in their lives, even though what they learned in school was designed to prepare them for their first career; and (2) that the pace of change is so fast that technologies and skills to use them become obsolete within 5-10 years.

**School-to-work transition is insufficiently supported.** If the world of working and living relies on collaboration, creativity, and framing of problems; deals with uncertainty, change, and distributed cognition; and augments and empowers humans with powerful technological tools, then the world of schools and universities needs to prepare students to function in this world. Industrial-age models of education and work (based on B.F. Skinner and F.W. Taylor; see Table 1) are inadequate to prepare students to compete in the knowledge-based workplace.

**The “gift wrapping” approach dominates educational reform.** Information technologies have been used to mechanize old ways of doing business, rather than fundamentally rethinking the underlying work processes and promoting new ways to create artifacts and knowledge. In learning, these technologies have been used primarily as add-ons (“gift-wrapping”) to existing practices [Fischer, 1998b] rather than a catalyst for fundamentally rethinking what education should be about in the next century. Conventional frameworks, such as instructionism, fixed curricula, memorization, decontextualized rote learning, etc., are not changed by technology itself. “Computer literacy” has often been equated with a bag of superficial and transitory knowledge rather than with what really matters about computers: namely, that all people can use them for their own purposes. New technologies and new media (such as the World Wide Web, multi-media design, etc.) are necessary to achieve certain learning objectives and to provide foundations for people to change their mindsets, but they by themselves are not sufficient.

## Changing Mindsets

Cultures are substantially defined by their media and their tools for thinking, working, learning, and collaborating. A large number of new media are designed to see humans only as consumers. Television is the most obvious medium that promotes this mindset and behavior [Postman, 1985]. Unfortunately, a consumer mindset does not remain limited to television, but in many cases is a model dominating our culture. In our educational institutions, learners are often treated as consumers, creating a mindset of consumerism for the rest of their lives [Illich, 1971]. Citizens often feel left out in the decisions by policy makers, denying them opportunities to take an active role.

The current mindset about learning, teaching, and education is dominated by a view in which teaching is often fit “into a mold in which a single, presumably omniscient teacher explicitly tells or shows presumably unknowing learners something they presumably know nothing about” [Bruner, 1996]. A critical challenge is a reformulation and reconceptualization of this impoverished and misleading conception. Although this model may be more realistic for the early grades in schools, it is obviously inadequate for learning processes as they occur in lifelong

learning, where knowledge is distributed among many stakeholders and “the answer” does not exist or is not known. Learning is more than being taught [Illich, 1971]. Learning new skills and acquiring new knowledge cannot be restricted to formal educational settings. By *integrating working and learning*, people learn within the context of their work on real-world problems. Learning does not take place in a separate phase and in a separate place, but is integrated into the work process. The direct usefulness of new knowledge for actual problem situations greatly improves the motivation to learn new materials because the time and effort invested in learning are immediately worthwhile for the task at hand — not merely for some putative long-term gain.

Many conventional frameworks are grounded in the behaviorist learning theory of Skinner and the models of industrial work of Taylor. Table 1 contrasts these approaches with new goals and new objectives for the information age.

Skinner/Taylor		Beyond Skinner and Taylor
there is a scientific, best way to learn and to work	--->	real problems are ill-defined and wicked
separation of thinking, doing, and learning	--->	integration of thinking, doing, and learning
task domains can be completely understood	--->	understanding is partial, tacit and situated; total coverage is impossible
objective ways to decompose problems into standardizable actions	--->	subjective, situated personal interests; need for iterative explorations
all relevant knowledge can be explicitly articulated	--->	much knowledge is tacit and relies on tacit skills
teacher / manager as oracle	--->	teacher / manager as facilitator or coach
operational environment: mass markets, simple products and processes, slow change, certainty	--->	customer orientation, complex products and processes, rapid and substantial change, uncertainty and conflicts

**Table 1: Transcending Skinner and Taylor**

The conceptual framework outline in Table 1 provides the foundation to differentiate between school and lifelong learning, as illustrated by Table 2. Schools often create mindsets about learning, teaching, and collaboration that would require a “*big switch*” at some point in people’s lives: seeing themselves as active contributors rather than as passive consumers. To create different mindsets, we need to change our formal educational institutions to environments in which knowledge is (collaboratively) created, externalized and shared [Arias et al., 2000]. Skills and processes that support learning as a lifetime habit must be developed, and efforts must be undertaken for learners to develop a positive attitude, enjoyment, and motivation toward learning — because no one will engage in processes and attitudes during their whole life for goals and objectives that they do not like.

	School/University	Lifelong Learning
emphasis	“basic” skills; exposure; access	education embedded in ongoing work activities; informed participation
potential drawbacks	decontextualized, not situated	relevant concepts are not encountered
problems	given	constructed
new topics	defined by curricula	arise incidentally from work situations
structure	pedagogic or “logical” structure	work activity
roles	expert-novice model	asymmetry of knowledge; reciprocal learning
teachers / coaches	expound subject matter	engage in work practice
mode	instructionism (knowledge absorption)	constructionism (knowledge construction)

**Table 2: Comparison of Different Conceptualizations of School/University and Lifelong Learning**

## Emphasizing New Forms of Learning from a Lifelong Learning Perspective

Lifelong learning refers to a society in which learning possibilities exist for those who want to learn. Table 3 summarizes four innovative forms of lifelong learning, and addresses their contributions toward the creation of mindsets and the media requirements generated by them.

Form	Comple- menting Form	Contribution toward Mindset Creation	Major Challenges	Media Requirements
self-directed learning	prescribed learning	authentic problems	problem framing	understanding evolving tasks
learning on demand	learning in advance	coverage is impossible; obsolescence is guaranteed	identifying the breakdown leading to the demand; integration of working and learning	critics; supporting reflection-in-action
informal learning	formal learning	learning by being in the world	larger, purposive activities provide learning opportunities	end-user modifiability
organizational learning	individual learning	the individual human mind is limited	shared understanding	externalizations understandable by all stakeholders

**Table 3: Overview of New Forms of Learning Contributing to Lifelong Learning**

## The Impact of Lifelong Learning Themes on Mindsets

Impacting *mindsets* is a socio-technical design problem [Fischer, 1999]. Research and practice should be conducted as an instrument of change to alter and improve the way people learn and think. Creating innovative media and technologies supporting a “new” mindset requires the following *co-evolution*: we must rethink and reinvent learning, working, collaboration, and education in the context of new media, and simultaneously we must invent and create new media in the context of learning, working, collaboration, and education.

**From Consumers to Active Contributors.** To create designer mindsets, one of the major roles for new media and new technologies is not to deliver predigested information to individuals, but to provide the opportunity and resources for social debate, discussion, and collaborative knowledge construction. In many human activities, learning cannot be restricted to finding knowledge that is “out there.” If nobody knows the answer, we have to create new knowledge. The knowledge to understand, frame, and solve many problems does not exist, but is constructed and evolved during the process of solving these problems [Schön, 1983]. From this perspective, *access* to existing information and knowledge (often seen as the major advance of new media) is a limiting concept. Many social and technological innovations are limited to provide primarily better access, leading to “consumer” cultures [Fischer, 1998a]. Our research focuses on and creates support for lifelong learning activities grounded in informed participation [Arias et al., 2000]. This goal creates the challenge to develop open, evolvable systems, allowing end-users themselves to extend their tools and information spaces, and thereby become independent (if they desire) of professionals.

**New Media in Support of Lifelong Learning.** The most promising way to provide opportunities for an *active contributor mindset* is to allow learners and workers to engage in design activities by creating environments supporting them in making external artifacts that they can reflect upon and share with others. Over the last ten years we have built a large number of different *domain-oriented design environments* supporting the different forms of learning described in Table 3. These environments are not only used to instruct and assist novice designers, but they are able to support designers as lifelong learners. A specific example of a domain-oriented design environment is the *Envisionment and Discovery Collaboratory* [Arias et al., 2000]. This system (for details see: <http://www.cs.colorado.edu/~l3d/systems/EDC/>) not only provides access to existing information, but allows all participants to engage in *self-directed learning* by supporting informed participation and collaborative knowledge construction. It combines physical and computational simulations to allow organizational learning by supporting group decision-making, mutual learning processes, and the creation of shared understanding. The incremental design and construction of an externalized world provides numerous opportunities for all involved stakeholders for self-directed learning and learning on demand.

The “*open source*” movement [O’Reilly, 1999] that is currently emerging as a new paradigm for software development represents an exciting perspective for a society of lifelong learners. “Open source” approaches regard software and other cognitive artifacts not as a commodity to be consumed, but one that is collaboratively designed and constructed — providing a model for the knowledge society of the future.

## Evaluation

Self-directed learning, learning on demand, informal learning, and organizational learning are fundamentally different from the traditional classroom learning dominated by curricula and tests. Evaluation of these forms of learning is an important, unresolved research topic in itself; there are no off-the-shelf assessment techniques available for these new forms of learning. These new approaches require alternatives to standard tests and the experimental methods of psychology, which measure how people perform on predetermined tasks undertaken by subjects in a laboratory or in an instructionist classroom. Approaches from anthropology, sociology and ethnography that study people “in the wild,” as they go about their everyday activities in offices, homes, schools, laboratories, or wherever they live their lives are needed to evaluate these forms of learning. It is all too easy to collect data and statistics about those things that are easiest to identify and count or measure but have little or no connection with the objectives in which we are really interested. We have to develop evaluation techniques based on performance-based examinations or execution of large-scale projects and portfolios [Gardner, 1991]. It is obvious that a change of mindsets cannot be evaluated by a test; it requires assessment of motivation, interest level, and participation in communities of learners combined with techniques for long-term longitudinal assessment.

## Conclusions

Peter Drucker argued that “*There is nothing so useless as doing efficiently that which should not be done at all.*” Adding new media and new technologies to existing practices will not change the mindsets that learners will acquire in our formal educational institutions. These mindsets are the major stumbling blocks preventing people from engaging in lifelong learning. Moving beyond the “gift-wrapping approach” requires that we explore fundamentally new possibilities and limitations of computational media on how we think, create, work, learn, and collaborate. New tools will not just help people do cognitive jobs more easily but in the same way they used to, but they will also lead to fundamental alterations in the way problems are solved. A lifelong learning perspective requires that we change mindsets. This will include, for example, that teachers understand their roles not only as truth-tellers and oracles, but as coaches, facilitators, and mentors; and that knowledge is not presented as a commodity to be acquired or delivered, but as a human struggle to understand and as a source to deal with personally meaningful problems. The future of how we live, think, create, work, learn, and collaborate is not out there to be “discovered”—it has to be *invented and designed*. Mindsets grounded in seeing learning as an important part of human lives will be an integral part of the future.

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