Paradoxes in Open, Networked Learning Environments: Towards a Paradigm Shift

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Abstract
The emergence of networked learning environments entails fundamental changes in the way educational systems function. The present paper aims to anticipate on practical consequences for learning and teaching. It will briefly go into the role of constructivism as an alternative learning paradigm to describe such consequences. However, the use of constructivism as a new frame of reference in education raises new questions that are still hard to answer. To illustrate and address the fundamental problems associated with networked learning environments the present paper introduces a number of paradoxes and elaborates on these.

Introduction
During the last decades, proclaimed revolutions in education have hardly proved to produce substantial changes in educational practices (see for instance Kearsley 1998, Kaufman 1998). Despite numerous initiatives to innovate educational systems and to improve the overall-quality of educational approaches, little seems to have changed. The common concepts of tutoring, classrooms, instruction, homework, and examinations seem to be barely touched.

The courses are quite obvious. First of all, educational institutions are likely to exhibit a basic conservatism: after all, their pedagogical tasks tend inevitably to preserve and favor the status quo. Secondly, all staff members involved are products of the system itself and probably are pervaded with common patterns and role models. Third, any educational institute, while dealing with hundreds or even thousands of learners, represents an operational system exhibiting the intrinsic inertness associated with any large system: a departure from the rule is presumed to have a negative effect on the primary processes. Finally, educational innovation is easily confused with the introduction of new technologies. These often conserve the standard patterns, while only changing outward appearances (Kaufman, 1998). For example, computer programs for drill and practice as well as tutorials gratuitously represent traditional teaching models; even an "advanced application" like the virtual classroom represents both socially and functionally a traditional classroom.

Yet, despite these gloomy observations, this article claims that a fundamental change in education is at hand. We identify three major factors that clear the way for substantial innovations: (1) the convergence of classroom teaching and distance learning, (2) the effective technology-push for addressing new ways of collaborative learning and (3) the changing student-tutor relationships. As will be discussed below educational institutions increasingly will adopt some kind of networked learning environments to support and enhance their educational processes (Thompson 1998, Peraya 1998, Kommers 1998). We will go into the role of constructivism as an alternative learning paradigm to describe such changes. However, before embracing and acknowledging these developments to be a fundamental educational innovation, it is necessary to analyze and discuss the practical consequences of such a paradigm shift. While referring to the "virtual company" of the Open University of the

Netherlands as an example of a networked learning environment, we will examine nine dilemma's or rather paradoxes that are inextricably associated with the paradigm shift that is now underway.

Convergence of Classroom Teaching and Distance Learning
Traditionally, classroom teaching has been contrasted with distance education. In classroom teaching, the educational setting is characterized by the confines of a classroom and the physical presence of some dozens of students and a teacher. Classroom teaching shows a standard pattern of plenary instructions by the teacher, although sometimes students are set to work in groups or individually. In distance education however, students work individually at their own homes using a set of self-contained study materials, i.e., textbooks, workbooks, video programs, computer programs, etc. Tutorial support is limited in amount and highly detached because of the mechanism of correspondence by post, or at best by telephone (but this is changing, as discussed below). While classroom teaching constrains students to a fixed time, a fixed location and a fixed pace, students in distance education are free to choose when to study and at what pace. On the other hand, classroom teaching exhibits and exploits a great deal of social interaction between students, whereas studying in distance education is usually a highly solitary job (though this too is changing, as discussed below).

In recent years, the contrast between classroom teaching and distance education has gradually become less pronounced. The ever-growing use of computers and computer networks in education has both affected the teacher's role in classroom teaching and the social isolation of students in distance education. While offering a variety of computer-mediated communication tools, cyberspace appears to be a promising meeting point for anyone involved in the educational process. Naturally, such "virtual communities" strongly meet the need for social interaction within settings of distance education, giving rise to the introduction of models for collaborative learning. On the other hand, for regular schools and universities it is quite common to offer students some kind of a computer-supported learning environment that incorporates to some extent concepts of distance education: tailor-made, individualized, educational programs, remote access, self-paced instruction, etc. Obviously, classroom teaching and distance education are converging on a new educational approach that combines the strengths of both practices, while bypassing their weaknesses: it will allow for addressing individual needs within a collaborative context. Though pushed primarily by technological means for delivery and support, it represents an educational innovation that deeply affects pedagogical fundamentals of education and learning, supporting new ways of learning and creating a new educational frame of reference.

New Avenues for Collaborative Learning
From a user's perspective software becomes more and more simple. Interfaces are usually WYSIWYG ("What you see is what you get") and many programs can be handled without any training or without any knowledge of specific commands or procedures. Although diverging standards are still available, object-oriented programming techniques tend to support the development of generic user-machine interaction patterns - or rather, a standardized human-computer interaction code - using the metaphors of windows, buttons and other material objects. Moreover, because of the dissemination of computers in society, users have become gradually more experienced with computers.

The usefulness of computers is largely enhanced by telematics facilities, be it a-

synchronous like mail or news, or synchronous, like real-audio/video or videoconferencing. Here, the computer mainly serves as an inter-human transmission channel, i.e. like the telephone, which causes the mere technical aspects of human-computer interaction to be dominated by more common patterns of human-human interaction. In addition to such "ordinary" communication patterns a whole new class of software applications is being developed that supports all kinds of collaborative work. This so-called "groupware" offers a number of extended functionalities for the support of collective design and development, to which no real-life counterparts are existent. Clearly, such new technological tools introduce new ways of colloborative learning that necessarily presuppose the use of computers. In fact, the role of media in education changes from distributor and presenter of knowledge to that of a flexible, educational tool in support of all kinds of learning activities. So, while technology used to be associated with awkwardness, complexity and restrictions, it now opens up new ways of working and learning together in – more or less - user-friendly ways.

Changing Student-Tutor Relationships
The availability of a world-wide computer network is assumed to have a tremendous impact on existing social and cultural patterns (Schroeder 1996). For students, the Internet opens up a vast reservoir of information that can be accessed and filtered with the help of sophisticated search engines. In addition, the Internet constitutes an open (virtual) community, showing only few barriers for the exchange of ideas with others. As a consequence, some basic suppositions of educational systems are affected.

First of all, it is unavoidable that the role and position of a tutor changes. While students have easy access to new or actual information, not even known to the tutor, students are less inclined to recognize the tutor's authority as an (absolute) expert in the field.

Second, delicate information like examination assignments and associated elaborations will inevitably be widely distributed among students using the World Wide Web. It would be naive to presume that no extended "underground" student circuit will come about. Yet, we should not blame the students for that. Any information society tends to be an open society, that is, any information available to one member of a sub-class is bound to become available to all members of that sub-class.

Third, while introducing remote learning facilities and models for collaborative learning, the contact with a tutor will become less prominent: students will be thrown together, will learn from each other and occasionally will assess each other.

Fourth, in many respects, computer-mediated communication is different from face-to-face contact. Emotions are easily poorly transferred and may easily be disregarded or misinterpreted. In delayed communication (asynchronous), speaking skills and assertivity will become less important. The teacher's authority, being (partly) based on professional communication skills, will be further affected by this impoverishment of the communication. These new communication channels are even presumed to be in favour of timid, close-mouthed students.

Altogether, these factors cause the relationship between tutor and student to become more egalitarian: some of the tasks traditionally assigned to the tutor are taken over by the students themselves. This is amplified by the process of life-long learning, which causes a severe change in student's profiles. In many cases, students will be adult, highly autonomous, mid-career professionals having jobs, who consider themselves as customers of educational services and expect to be treated

accordingly. As a consequence, the common authority and predominance of the tutor is highly undermined, causing the tutor's role to shift to that of a coach, providing meta-level guidance and support to stimulate and optimize each student's learning process.

Changing Basic Principles

Having recognized these changes of educational systems many educators have adopted constructivism as an alternative learning paradigm to the objectivist tradition (Carr, 1998; Duffy, 1991). According to constructivism learners are not passive absorbers of external inputs, but actively construct (meaningful) knowledge from individual experiences. Constructivism closely addresses the indicated, fundamental changes of the student's roles and responsabilities. It focuses on the learner's control of learning processes; it narrows the gap between the artificial world at schools and real-life society; it values the occurrence of multiple perspectives; and it supports collaborative work to synthesize shared knowledge. Clearly, constructivism offers a close match with the changing relationships between teachers and learners. Students will encounter more freedom to choose and arrange their learning processes in consultation with other students, while the teacher's role changes from content specialist to process facilitator.

Although some empirical data are available already (cf. Sloep, 1998; Thompson, 1998), many questions about the functioning and effectivity of networked learning environments are still unanswered. From a theoretical point of view one might propose that responsabilities and mutual commitments between tutor en students are unclear or even contradictory. As will be discussed below, the use of constructivism as a new frame of reference in education introduces quite some new questions that are still difficult to answer. To be more concrete, we will briefly depict a networked learning environment as introduced by the Open University of the Netherlands in the early part of 1998, that exemplifies the fundamental conflicts embedded in the system. Thereafter, we will elaborate on these conflicts.

An Example: The Virtual Company

In the virtual company as described by Westera (1998) and Sloep (1998) students participate in a virtual community that is built upon the functional structures of real-life companies. The virtual company functions primarily as a computer–mediated vehicle for competence learning. Students in the virtual company take up professional roles to run the business, that is, to achieve knowledge-centered products and services, while the Open University of the Netherlands facilitates the learning support structure, including intake of students, learning materials, coaching, and assessment procedures.

Note, however, that this educational approach should not be put on a par with common role-playing games, simulations, group work, practicals or apprenticeship learning. The virtual company claims to be reality, while it openly interacts with society. Its "virtuality" only refers to its location in cyberspace, but while serving real customers, providing real products and services, the virtual company "virtually" does not differ from a real company, apart from financial objectives. It is the students themselves that decide a great deal of what (learning or working) activities should be carried out, while starting from external orders in hand rather than tutor-controlled assignments. The student's autonomy fits quite well into the constructivist picture of learner control, self-confidence and collaborative processes. However, to prevent such a virtual learning community from degenerating into a chaotic en ineffective educational system, it is necessary to build in sufficient support and guidance

mechanisms.

Shouldn't there be some kind of supervision on behave of the educational institution to watch over the quality of learning, to avoid undesirable decisions or to control the educational process? And, if so, don't we get back into the common, traditional model of teacher control? In the next sections we will elaborate on this by analyzing nine paradoxes that come up in such shared, open environments.

Paradox 1 :
The Lazy Educator

What would be the use of educators if they would restrict themselves merely to defining legally recognized final objectives and performance levels without offering a way to get there? This point goes right to the heart of the matter, while it touches on the primary role and responsabilities of the educators themselves. Should they be accused of making easy money by leaning back without bothering about the student's plodding? Actually, the constructivist approach should in no way be equated with a hands-off policy. Although student-controlled learning implies a great deal of self-supportive behaviour by students, it is the educational institution's responsability to monitor and warrant the quality of learning.

This doesn't necessarily mean that tutors should control and decide on intended student activities, but rather that students be given access to supportive facilities to guide and improve their learning. In some respects, these open learning environments closely ressemble the pedagogical systems of Montessory (AMI, 1970) and Dalton (Parkhurst, 1924) that offer a great deal of individual freedom within a structural support system. However, in contrast with these "classical" educational systems, open networked learning environments show an autonomous development as to what activities are carried out, what external partners in society become involved and even to what domains of knowledge the learning is extended. Indeed, the educator's control will decrease and their support will only remain valued if they succeed in contributing evidently to student's individual and collective compentence growth.

Paradox 2:
The Unauthorized Quality of Informal Learning

If educators can hardly observe or influence the student's learning activities, the quality and effectivity of learning may be severely affected. In fact, in networked environments, quite some learning will take place beyond the teacher's scope, in discussions and in collaboration with fellow-students and external contacts. Clearly, such realistic, collaborative settings may provide rich and complex learning experiences. It should be noted, however, that a lot of the feedback that is received from fellow-students may be ineffective, incomplete or even erroneous. The absence of an authorized expert may easily allow for misconceptions. To prevent such misconceptions from becoming irreversible, the educational institutions should be entitled to intervene in time. Indeed, it is the educator's responsability to control the quality of learning. But, while promoting the model of self-directed collaborative learning, it is not clear when en how the educators should interfere.

While premature interventions are in conflict with basic principles of constructivism, delayed interventions may cause irreparable damage. Moreover, to be able to decide on intervening, the educators should continually monitor the collaborative processes in the learning environment. Here, it seems, the traditional ("objectivist") control mechanism seems to come in again. One should realize, however, that informal learning can hardly be monitored via formal mechanisms. Whenever students

become aware of the Big Brother-type behaviour of educators, they will find new ways to create informal channels that are inaccessible to the educational institutions. As a consequence, the quality of informal learning is determined by internal mechanisms of the environment rather than external standards.

Paradox 3
Collaborative Learning Is About Individual Learning
The concept of the "learning organization" is highly applicable to virtual learning communities. Self-effacing individuals are assumed to take part in specialist teams that use and produce collective knowledge and competences to pursue shared objectives. At this organizational level, it is the collective performance that decides upon failure and success. One might take the line that collaborative learning is all about shared knowledge, human cooperation and the collective construction of knowledge. However, it should be recognized that learning remains a strictly individual process, actually located in the brain of the person involved. Although collaborative learning refers to collective processes and social construction, its primary focus is to optimize the conditions for individual learning; the team of learners makes up the educational context to provoke individual learning experiences. In fact, collaborative learning only makes sense if individual knowledge, targets and responsabilities of team members are significantly different, or rather, complement each other: collaborative learning promotes cooperation between students, while acknowledging and enhancing individual differences.
So, despite of the teamwork, group learning will give rise to explicitly inhomogeneous and individualized achievements. As a consequence, individual ambitions may frequently conflict with collective goals, or, conversely, collaborative work may conflict with individual needs. This may be called a rather unpleasant side-effect of what is meant to promote individual development.

Paradox 4:
Well-Meant Social Behaviour Affects the Quality of Learning
The concept of collaborative learning departs from students working together in harmony to realize shared targets. Within such a model of fruitful, almost heavenly cooperation there is no room for competition, conflict or envy. Unlimited helpfulness, however may easily interfere with individual objectives and ambitions. Considering the nonhomogeneous profiles of the learners it will frequently occur that one student is capable of helping the other. Such supportive behaviour can be very heartwarming and encouraging. Yet, any support or instructions by fellow-students may be assumed to lack the professional qualities that could be provided by the traditional teacher.
Unavoidably, a lot of this fellow-instruction may be assumed to be hardly effective or even incorrect. The fact that a lot of this collaborative support occurs out of sight, doesn't necessarily mean that it doesn't exist. Even worse, unrestrained helpful behaviours, no matter how well-intended these are, may easily shift to merely taking over individual tasks, while not taking account of the educational needs of the person involved. One should assist but not take over. Therefore, well-meant social interaction, proclaimed as an essential ingredient of the collaborative learning environment, may severely frustrate the learning processes of individuals, though grateful they may be.

Paradox 5: Collaborative Learning Conflicts with Expertise
To some extent, students in the shared learning environment will be able to support

each other. As stated above, however, collaborative learning does not imply that students decide to redistribute their learning tasks to achieve a better match between expertise and requirements. From the perspective of short-term collective output - in the virtual company the output would be the products and services for the external customers - such match would be most sensible. Yet, from the educational perspective it is necessary to map individual gaps of knowledge and competences before assigning tasks that allow one to compensate for these gaps; of course, while taking into account individual learning objectives, preferences and capabilities.

As a consequence, any task should be carried out by more or less inexperienced individuals, who strive for improving their performances; after all, the shared learning environment should aim at personal growth and development, not at establishing previously mastered knowledge and competences on behalf of some third party. Evidently, such task assignment does not exploit the available expertise in the most convenient way. But, as can be observed from models in human resource management, such a policy of personal development pays off in the long run (Walton 1984).

Paradox 6
The Pursued Reality in Education is Restricted

A virtual learning community that claims an open interaction with the outside world represents a legal entity in society. That is, any social intercourse is liable to legislation and customary manners. For students interacting with third parties – be it suppliers of information or consumers of services – it should be clear that the learning environment is no longer a fenced-off and protected area that allows carefree activities, but that it is essentially a part of the outside world. To be taken for real by the outside world implies that no disclaimers should be advocated; any interaction with the outside world is to be taken seriously. Students should be well aware of their vulnerability and act with cause and sense of responsability – note that it is just these authentic elements that are assumed to provide valuable learning experiences: the thrill of real life.

From the external perspective, however, interaction with the virtual learning community can hardly be taken seriously. Why should any company, institution or individual want to deal with such an indefinable and unauthorized organization that is made up of personnel that is obviously incompetent and unqualified? A virtual learning community can and should never deny its educational objectives, while positioning itself as a professional partner. As a consequence, de pursued reality will be restricted to acceptable limits. The most obvious, external parties will be those parties that may want to contribute to or take part in the educational processes themselves. That is, only a selective part of reality can be committed to the learning environment. Clearly, it is the educational objectives themselves that hinder reality to enter the environment.

Paradox 7:
Educational Philosophy May Conflict with Community

An open, virtual learning community is to be regarded a social system that develops more or less autonomously, according to internal rules and the inherent culture. As indicated above, the philosophical foundations originate from constructivist theories of learning. Participants are conceived of as independent, self-supporting and responsible individuals who are capable of deciding on their own learning activities. In the case of the virtual company, students set the task to develop knowledge-based products and services for external customers. To meet these tasks, the virtual

company adopts a mission statement, an organization structure and a business philosophy. While the educational philosophy has been stated by the educators, it is the learners (participants) in the virtual community that are entitled to develop their business philosophy, including premises for strategic decisions and personnel management. Severe problems could arise if the business philosophy diverges significantly from the educational philosophy.

This is hardly hypothetical, because running a business requires different conditions than running a learning environment. The educational premises of learner-autonomy and self-reliance would allow the learners to define a business philosophy that is strictly opposite to the learning philosophy, for instance by introducing a traditional, hierarchical management model to reduce individual elbowroom, initiatives and responsabilities. It would be hardly acceptable if the organisational or business philosophy would conflict with the educational premises. Therefore, the possible business models will be confined to human resource-like approaches, stimulating commitment, devotion and responsabilities of individual workers (Walton,1984).

Paradox 8:
Reality Learning Necessitates Additional, Embedded Learning Facilities
Any learning environment is meant to offer the learners sufficient opportunities to train and enhance their performances. So does the virtual company; in fact, the virtual company constitutes one full-blown training opportunity. An important condition for training is that the learners are allowed to make mistakes; in many cases, making mistakes is a valuable source of learning. However, if the learning environment claims to incorporate a great deal of reality, for instance, by allowing open interaction with the outside world of customers and suppliers, training and reality become intertwined. Consequently, this makes any learner performance realistic and risky in the sense that no mistakes are allowed. For instance, when students in the virtual company have to present some results to external customers, reality is so intrusive, that students do not experience such an event as a training opportunity. Before even depicting their performance, students might want to train and exercise on it, while shielded from reality. This means that the virtual company should accommodate additional training facilities, available for participants to prepare for their tasks. Clearly, it is a paradox that the virtual company, being a learning environment as such, needs to provide additional training facilities for students to allow them to prepare on their learning tasks. Moreover, because learners may experience their interactions with fellow-students, be it in pairs or in larger groups, as a performance that should be trained for, one could easily suggest the illusion of infinity here: training how to train the training for training…etceteras. Such mechanism of self-reference demonstrates a fundamental problem of open learning communities in general.

Paradox 9:
How to Design a Self-Developing System?
Traditionally, systems design starts from a quite mechanistic or even deterministic perspective on the world, while trying to capture the systems structure and systems processes in detailed descriptions. In fact, this exemplifies the pursuit of ultimate control over the functioning and boundaries of the system. It also exemplifies the tendency to control the behaviours of learners. Such principles hardly match to the self-directive, autonomous behaviours of virtual communities. Yet, in the last decade there has been an increased focus on open systems architectures and enabling technologies, allowing systems development to change its focus from rigid, tailor-

made applications to meta-design, offering generic tools for users to create their own environments. In the domain of shared environments a good example would be multi-user dungeons or MUDs (cf. Cox 1996); to some extent the users - or rather inhabitants - are provided with appropriate tools to build their own locations and objects. Unlike before, the role of the designer does not presuppose complete comprehension and control of the processes involved. In fact, while dealing with a social system like a learning community many of the systems behaviours will be unpredictable. The idea of a systems designer acting as the "Grand Watchmaker" running the world's machine is outdate and absurd. Likewise, the idea that teachers should have the ultimate control over the educational processes can no longer be supported.

Admittedly, it is true that the educational institutions offer educational programs, produce learning materials, assess students and are entitled to give out legally recognized certificates. This indeed makes up their positions in society. But as indicated before, this does not necessarily mean that the processes involved must be controlled by them exclusively. Learners are preferably perceived as co-developers, not merely with regard to the technical and organisation boundaries of the educational system, but also with respect to the development (construction) of knowledge and competences as such.

Concluding remarks

In this article, we have examined possible consequences of emerging networked learning environments. To support the discussion on the associated basic principals, we elaborated on a number of paradoxes arising from the changing relationships between teachers and students. The entanglement of education and society causes fundamental premises of social, political and cultural systems to become involved. Though it is obvious that such networked environments entail a fundamental change in the education systems, the full implications can hardly be foreseen. Clearly, the present analysis cannot be conclusive.

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