Eunika Baron-Polańczyk
Poland

The New Educational Review

The Model of the Continuum of Teachers' Learning Environment A Cloud or a Silo?

Abstract

The article presents a multi-dimensional model of a continuum in educational environment as far as teachers' activity in the postmodern world, inundated with rapidly developing Information and Communication Technology (ICT), is concerned. The conception is designed by means of literature analysis, complemented with the findings of empirical/diagnostic/correlative research of quantitative/qualitative character, meant to pinpoint the levels of 1160 teachers' information literacy within the area of the use of ICT tools and methods. The boundary values of the model were determined (i.e., the concept-constructs of "cloud" and "silo") together with their referents to six layers, including: technology, society, economy, knowledge, culture and philosophy (epistemology, axiology). Also, an attempt was made to calibrate teachers' performance in their educational environment at the time of technological and cultural change.

Keywords: *teachers' information literacy, ICT, learning environment model, cloud-silo*

Introduction

The ever-emerging new generations of digital media confront teachers with new challenges and, consequently, with continuously redesigned questions about the rationality and relevance of the use of ICT tools in educational practice. For many, the world of digital media may come across as a strange and hostile ele-

ment. And yet, from the perspective of the philosophy of work, humans (*homo creator*) not only created themselves, but also created a human world out of the material provided by nature. The human world is tamed nature – buildings, roads, bridges, communication, tools, powerful machines and automated equipment (Nowacki 2005: 17), and nowadays also ICT instruments. The achievements of our predecessors undergo strenuous reinterpretation, and as no "ready-made worlds" are presented to succeeding generations, each cohort of newcomers is forced to create their own universe by means of interpretation of facts. Thus, they must meet the continually growing human needs and create newer and newer concepts corresponding to the ever-growing number of experiences and the ever-newer challenges facing the upcoming generational succession. Can the modern world of digital media be perceived as tamed nature acting as an ally of education? Is the current material world of ICT going to instigate "education in the clouds"? Or perhaps "education in silos" will be the consequence of the evolving information and communication technology? Therefore, how to calibrate teachers' role and responsibilities in the postmodern world?

Research Methodology

The theoretical and methodological foundation of the research together with some important empirical results and conclusions (for the sample of 1160 teachers) are presented in "The New Educational Review" (Baron-Polańczyk 2013: 324–334).

The undertaken study, having assumed the form of diagnostic/correlative research (Ferguson, Takane 2003: 33) of quantitative/qualitative character (Dróżka 2010: 125), mainly embedded in media pedagogy and pedeutology, strives to find answers to the following question: what is teachers' information literacy in the use of ICT methods and tools in the context of new technological trends and the accompanying civilisational changes? The development of a multi-layer model of the continuum of educational environment, formed under the influence of rapid technological change, constituted one of the theoretical objectives predetermined for the research. Also, an attempt was made to define teachers' place, denotation and key competences within this environment. This approach is rooted in a deep conviction that educational institutions and teachers themselves must help the new generations to find their bearings in the complex amalgam of the postmodern world, because "for several decades now we have been living our lives in provisional atmosphere, awaiting some fundamental change meant to turn the

existing order upside down – or alternatively, searching for more or less "absolute" values allowing us to transcendent the pervading sense of absurdity of existence" (Melosik, Szkudlarek 2009: 14).

As a result, the analysis of literature, together with the findings of environmental research, allowed for a better definition of teachers' professional activity within their educational environment in the era of ICT. The boundary values of the model designed and presented in this article are included in the following concepts-constructs: 1) *cloud* – inspired by the IT concept of *cloud computing*, and 2) *silo* – inspired by the cognitivist research literature on knowledge management and social capital, which features the notions of *silo effect* and *information silo* (for a detailed analysis, cf., Baron-Polańczyk 2011).

Research results and discussion

The developed concept (multidimensional model) of the continuum in teachers' activity within their educational environment of the postmodern world, affected by rapid development of ICT, isolates six layers (cf., Table 1).

(1) The first layer of the use of the terms-constructs *silo* and *cloud* refers to ICT, more specifically, to the revolution which is being effectuated right before our eyes, in which the computer, originally locked in strictly protected data centres, found its ways to office desks, then merged into one big network with other computers, and ultimately in all probability, it will become just a plug to data, programs, and an assortment of services available in the network cloud. The growing importance of mobile technology is worth noting here as the access to the cloud is increasingly provided by tablets, phablets, smartphones, or light ultrabooks, chromebooks, rather than by the classic desktop PCs or laptops. The sales of mobile devices remain in constant upward surge mainly in the wake of the trend of the development of fast data transmission technology induced by mobile phone operators. The transmission standard known as *Long Term Evolution* (LTE), which is a step in the direction of the so-called fourth-generation of mobile telephoning, makes web surfing possible at the speed of up to 150 megabits per second, insofar only available through fixed landline broadband connection. As a result of these changes, small, lightweight, handheld devices will soon ensure steady and rapid access to data stores, applications, utility computing and many different network services provided by dedicated servers. The steadily declining cost of this new technology is also of significance, as the trend unquestionably makes it easier to spread and thus, turns it into an egalitarian value.

(2) In the second layer, conventionally labelled as social, the impact of ICT on all forms and manifestations of the functioning of the post-industrial society constitutes a focal point. The network is not only a new communication tool. Social networking and virtual communities have become permanent components of social life and a fascinating object of sociological research. At the same time, many members of these communities end up in psychologists' offices, because network-based interactions fail to meet all their social needs as they are far from substituting all culturally conditioned signs of being **with** others and **for** others. Simple multiplication of virtual contacts provides illusory exemption from the hassle of establishing real relationships and having to deal with the accompanying, inevitable difficulties and conflicts. Virtual contacts are beginning to dominate over traditional liaisons, but they are shallow and superficial (Bauman 2010). Web presence becomes a form of addiction, because it is an escape from loneliness, offsetting a sense of inner emptiness. Virtual life is undoubtedly more comfortable, but is it worth the resignation of one's own? The basic feature of the new network society, besides the completely unseen forms of communication and virtual interaction, is its focus on the processing of information, knowledge, symbols and ideas. There are frequent references to the birth of a knowledge society and knowledge economy. As a result of these changes, also separation of economics and finances from real economy has become evident.

(3) Therefore, the second layer is inseparably associated with the third one, i.e., economic layer. At this point, search for principles on which the great common civilisational heritage – culture and especially knowledge – are shared and promoted, is worth mentioning. Is everything that goes beyond the hackneyed cultural canon subject to strict regulations, such as the protection of copyrights and patents, or should it rather be a common good, widely and quickly disseminated with an aim of raising the civilisational level of all areas, including those that are subjected to exclusion? On the one hand, the sphere of symbols is the most important asset of modern economy, so it should be of value and thus, well protected. On the other hand, thanks to the ongoing technological progress, collection, processing and further distribution of these symbols are becoming cheaper. This paradox was perceived by hackers already at the early developmental stage of the Internet and consequently it led them to the idea of free information, the outcome of which is evident in the development of the Free Culture Movement. The development of new technology is conducive to constant changes in the intellectual property law and poses the challenge of creating a new type of economy, as it is still unknown who, how and how much is supposed to pay for

the culture delivered through the network. The search for an algorithm which would make it possible to valuate cultural goods created and made available on the Internet is in progress. Their recipients would become the main sponsors of the authors through a system of micropayments. There is also no shortage of network anarchists, a specific subculture, gathering the proponents of modern technology, alternative culture and political anarchy. For them, the Internet is still the Wild West of the colonial era. The staunchest defenders of Julian Assange, the founder of Wikileaks, a portal disclosing political hypocrisy of the modern world, hail from the ranks of such circles. Nowadays, however, they are increasingly identified with cybercriminals, as they oppose all attempts at ordering the Internet and at bestowing it with some legal and market framework, similarly to other, more established forms of media. The widely-discussed concept of human capital often becomes synonymous with the well-being of societies and their individual members. However, it is often regarded as a manifestation of objectification and deprivation of human identity, in faith that human individuality may not be reduced to the role of yet another machine in the labour market, cripplingly overpowered by consumer marketing. Especially education should not subscribe to the formation of uniform people – citizens with standard education, thinking of minimum and homogeneous needs. It is no coincidence that demonstrations of frustrated students in Berlin and other European capitals proceeded under the banner: "We are not human capital".

(4) Knowledge may constitute the fourth layer in our model. The tradition of epistemology teaches that Behaviourism, Cognitivism, and Constructivism are the three major theoretical pillars supporting the processes of the creation of teaching conditions and explanation of the learning mechanism. From the psychological perspective, a classical notion of knowledge is understood as an individual personal state of cognition. However, technological changes forever force us into constant verification of well-known and defined concepts. This is how the Theory of Connectivism came to life (Siemens 2005). The key to this new concept lies in its controversial assumption that knowledge may be nested in network resources, and therefore beyond human mind. It also points to the fact that human knowledge, being conditioned by evolutionary determinants, continues growing in a linear fashion, while the knowledge available in the network grows exponentially. The notion of Connectivism denotes the primacy of the network, whose nodes constantly compete for connection, so that it can continue living and learning. Creating connections and finding information are its basic skills. The proponents of this theory maintain that pupils, when connected to the

Internet, find there more than just unverified information. Based on the findings of neuroscience and mathematical models of networks, they argue that a structure of this type is self-learning and includes knowledge which is beyond perceptual capabilities of an individual. Therefore, no one is condemned to cognition limited by personal characteristics, as instead of one's own memory, they can make use of unlimited external memory. Only one question remains open: what will happen when the connection fails?

(5) The fifth layer, cultural (cultural anthropology), undoubtedly provides a superstructure of this problem, because we constantly inquire about the intrinsic qualities of human nature, about the paradigms of humanity. Are we governed by individualism, greed, egoism, or are we social and empathic beings, ready to help each other out? Is the greedy *homo oeconomicus* exposed by neoliberal theories dominant in us or are we already prepared to share goods in the spirit of solidarity? The Internet constitutes a primary source of culture for the new generations. Such worldwide digitisation of culture, on the one hand, requires new legal foundation and a degree of understanding of digitally born culture, but on the other hand, it also provides a chance for a new start and revival of cultural heritage. However, there is no reason why such search for new canons should be accompanied by discontinuity of past experiences. Thus, old media, rather than disappear, become the content of new media, the process being both evolutionary and revolutionary in character. Such activities modernise our lives and democratise our access to culture. At the same time, a large proportion of the population ceases to participate in the less accessible and more expensive analogue culture, passing around galleries, museums, operas, theatres or cinemas. They are susceptible to media marketing, which often deprives them of the ability to think critically and make informed choices. Media in service of global corporations for advertising purposes are designed to control and manipulate the collective consciousness, making it difficult to distinguish between what is momentous and valuable and what is the by-product of digital civilisation. The Internet, which was originally seen by its creators as a realm of freedom and equality, may now use its technological advantage in bad faith, turning itself into an area of enslavement and permanent control. In this context, education has a fundamental mission to fulfil.

(6) Generalisation of these considerations may be, perhaps, sought in the sixth layer, i.e., philosophical (particularly epistemological and axiological) one, as the silo and the cloud are indeed the Hegelian designates of the thesis and antithesis,

where the silo is alienation – a permanent state of conflict with other people leading to mutual objectification, and where the cloud may be seen as a somewhat utopian vision of a wise, solidary and sharing society which respects freedom, individualism and individual identity. It is a constant search for a dynamic synthesis – a balance between what is individual and what is social, between individualism and the social dimension of human life, and finally between subjectivity of individual beliefs and objectivity of knowledge, if such is at all given to us.

Table 1. A multi-layer model of continuum in the learning environment as far as teachers' activity in the postmodern world, inundated with rapidly developing ICT, is concerned (own source)

Silo or…	**Continuum of educational environment**	**…cloud?**
SILO – designates	**Construct layer**	**CLOUD – designates**
stationary computer, LAN network, stationary work, close-source (proprietary) software…	technology	WAN network, global resources, mobile technologies, cloud computing, open-source software…
individualism, egoism, strong individual identity, alienation, objectification, cult of personality – negation of society…	society	community, altruism, respect for otherness, virtualisation, multiplication of contacts, team work, social networking…
homo oeconomicus, dominance of the market and money, globalisation, real economy, economic liberalism, greed, cult of money…	economy	sharing resources free of charge, processing of symbols, common good, donation and partnership, economic solidarity…
patents, enforcement of copyrights and intellectual property, one's own knowledge, canon of guaranteed knowledge, linear growth of knowledge…	knowledge	knowledge sharing, culture of donations, external memory, market criteria of knowledge (employers' needs), exponential growth of knowledge…
high culture, canon of cultural heritage, traditional culture, post-figurative, elitism…	culture	Free Culture Movement, symbolic culture, open educational resources, digitalisation of cultural goods, popular culture (mass), egalitarianism…
cognitive objectivism, strong moral and ethical patterns, limitation, real, analogue world, determinism, order…	philosophy (epistemology, axiology)	subjectivism, cognitive relativism, moral indifferism, liberty, virtualisation, digital world, indeterminism (randomness), chaos…

The primary objects of our study, namely education and teachers, are similarly subjected to these multidimensional juxtapositions. The sphere of education, which is after all defined as a continuous and lifelong process, must expressly find its position within all the complexities of the contemporary world. On the one hand, it is forced to keep pace with the technological stampede and the social and economic fluctuations that it inevitably brings along. On the other hand, it must act as a civilisational backbone which defines and nourishes the canon of cultural heritage as well as upholds the moral and ethical standards for future generations. As such, it neither should get carried away by network marketing and cultural indifferism, nor become a lonely reinforced fortress of redundant knowledge, out of touch with modern times. The role of the teacher in the teaching/learning process is nowadays undergoing a dramatic transformation: from being the main source of knowledge and the pillar of moral attitudes, through the role of an organiser, to the role of a defender against the informational chaos and cybercrime. This thesis is very well confirmed by long-term experimental studies by Sugata Mitra (2014), conducted within the framework of the programme "Hole in the Wall", on whose basis he even proposed the concept of Minimally Invasive Education, which he defined as a teaching method that an uses appropriately structured learning environment to raise adequate levels of motivation to self-study and team work, with minimum interference on the part of teachers or even devoid of them. Such an understanding of education transpires as a self-organised process of independent attempts at constructing knowledge by means of appropriately selected ICT tools, whose essence is learning to learn.

This situation requires a new definition of the place and role of the teacher in a complex continuum of the educational environment, and its balanced midpoint can be pinpointed only by wise, reflective teachers who may perceive these considerations as distant echoes of education. Echoes, because just like the flawed presentation of ideas in Plato's cave, the still very imperfect digital world begins to appear to those immersed in it as the only, true, free and autonomous reality. After all, digitisation is meant to deceive the analogue senses, and even they themselves only carry a vague representation of what is immutable, eternal and perfect. In this manner, the network and its ancillary digital technology favour the acquisition of one's own constructs of cognition objects, by which token, it very well fits into the current of cognitive idealism. Teachers must understand the digital reality and learn to harmoniously coexist with it, but at the same time, they cannot turn it into a substitute for "real life" with all its complexities. Virtualisation of cognitive acts deprives them of multidimensionality and multisensuality, making flawed human perception even more inadequate than it already is. Postmodernity

"exposes the foundations of the appeal for newly designed functions and concepts of modern teachers and for new styles of cultural persuasion, no longer based on the revelation of transcendent truths, nor on enlightening by the force of well-founded reasoning, nor on the other hand, based on the neo-evolutionary faith in progressive convergence of people and the accompanying reduction in diversity, the moment physical constraints and cultural regimentation are abolished" (Witkowski 1995: 237).

All in all, it may be concluded that the reserve of knowledge and skills already present in teachers can be in the majority of cases described as sufficient for the use of modern sources of information (which is also reflected in the report *Survey of Schools: ICT in Education*, 2013). Understanding of the new ICT trends, externalised in teachers' opinions through their interpretation and extrapolation, makes it possible for them to use digital tools without major problems. Thus, it is pleasing that the identified state of teachers' information literacy, satisfactory if perceived from a standard perspective, is directly reflected in their practical initiatives in the field of implementation of ICT in teaching and educational work. There is a link between the level of competence (results of teachers' cognitive results) and the level of their use of ICT tools and methods (adequate behaviour in educational practice) ($r2 \cong 0.50$; $r \cong 0.71$; $p = 1.5605E\text{-}244 < \alpha = 0.01$; for $df = 9$).

Teachers' reflections revealed their attitudes, tendencies manifested in deeds such as activities in the field of applying ICT to professional practice, as a direct (and often self-explanatory) response to social expectations towards their professional competence in this area. A detailed analysis of subjective opinions and experiences relating to consciousness and volition betrays teachers' tendency to the manifestation of analytical and critical approach to their responsibilities within the field of implementation of professional digital instruments.

When professionally evaluating their engagement in ICT, teachers put themselves ("I" – the teacher) and their work ("my" teaching) first. In the predominant praxeological thinking about their profession, they see the reasons and arguments in favour of the use of ICT in effective implementation of their professional responsibilities, mainly in efficient and optimal preparation and execution of classes. While appreciating the importance and great potential of technical measures in stimulating the teaching/learning process, they perceive the expansion of their ICT knowledge and skills mainly through the prism of their own professional development (promotion), as a duty and even as a necessity. The fact that they clearly favour organised and targeted forms of training over their own initiative and various forms of individual self-study, attests to the fact that they fail to see the broad potential inherent in self-education in the field of ICT by means of ICT

itself (failing to perceive the foundations of modern teaching and learning in the constructivist theory and cognitive science, not taking into account the formation of knowledge about ICT methods and tools by means of this technology). The principal motives for raising information competence in the use of ICT must be sought in full acceptance of teachers' professional role, in their sense of duty, and even in pressure and professional diligence, rather than in the admiration or a simple interest in contemporary technology.

The diagnosed condition of ICT infrastructure, providing free access to computers and the Internet (95.9%), secures technical and practical potential for every teacher (a member of the global, constantly evolving ICT world) participating in the process of permanent and open forms of education. Although teachers appear to be in favour of the Web community, their passive attitude is at odds with the culture of gifts, the idea of team work and the mission of teaching. When representing such a passive attitude of the Internet user, they favour the process of data gathering over the process of creating and sharing information. The computer and the Internet are good tools for them primarily to gather information and ready-made materials. They fail to see networking technologies as cognitive tools which shape cognitive skills, support the process of thinking and constructing knowledge, including the knowledge of the world of digital media. A similar, passive and demanding attitude is manifested by the surveyed teachers when they betray their expectations for external support in effort to increase the use of ICT. When perfecting themselves and their workshop, looking for help primarily in their natural work environment, they want to be recipients rather than donors of support and much more frequently refer to instrumental, informational and material reception than to exchange of this kind.

Conclusions

Referring to the forwarded methodological predictions, to the archetypal depiction of information competence in the field of ICT use, as well as to the metaphorical notions of *cloud* and *silo*, we may present a very general conclusion that the surveyed teachers are able to instrumentally function (by means of their engineering/technical/educational competence) in the cloud, but their directional characteristics (axiological, mainly encompassing the social sphere, training and self-study) limit their comprehensive functioning in the era of ICT and their participation in the digital culture, rather leaving them within the constraints of the silo. The restrictions in all-inclusive and creative existence in

the cloud, in open and long-lasting education, can be found in the expression of the attitudes which reveal teachers' shortcomings in the fields of: 1) awareness of the need and consequences of their activities in the use and design of ICT tools, and 2) assuming responsibility for the consequences of their own behaviour in the area of implementation of new technological trends in their professional practice.

However, we must bear in mind that ICT in education constitutes just one component of broader cognition. A tool which like any other technology in the history of civilisation is merely subservient to the creation of teaching materials of its time. What will the materials be and what will be the consequences of their use primarily depends on teachers. It is wise teachers, manifesting in-depth reflection on the educational use of ICT, who bear the responsibility for ensuring that school is not turned into a type of a silo, utterly detached from the contemporary times and their challenges.

References

Baron-Polańczyk E. (2011). *Chmura czy silos? Nauczyciele wobec nowych trendów ICT*. Zielona Góra.

Baron-Polańczyk E. (2013). *Teachers' Information Competence and Use of ICT Methods and Tools – Research Report*, "The New Educational Review" Vol. 32, No. 2.

Bauman Z. (2010). *Kultura 2.0.* In: M. Kuc, *Ucieczka od samotności*, "Rzeczpospolita", No 284, p. A20.

Dróżka W. (2010). *Trangulacja badań. Badania empiryczne ilościowo-jakościowe*. In: S. Palka (ed.), *Podstawy metodologii badań w pedagogice*, Gdańsk.

Ferguson G.A., Takane Y. (2003). *Analiza statystyczna w psychologii i pedagogice*. Warszawa.

Melosik Z., Szkudlarek T. (2009). *Kultura, tożsamość i edukacja. Migotanie znaczeń*. Kraków.

Mitra S. (2014). *Hole in the Wall experiment*, http://www.hole-in-the-wall.com/Beginnings.html [13.06.2014].

Nowacki T. (2005). *Tworząca* ręka. Warszawa.

Siemens G. (2005). *Connectivism. A Learning Theory for the Digital Age*. International Journal of Instructional Technology and Distance Learning, 2(1). Retrieved January 10, 2008, http://www.itdl.org/Journal/Jan_05/article01.htm [25.04.2014].

Survey of Schools: ICT in Education, Benchmarking Access, Use and Attitudes to Technology in Europe's Schools. (2013). Final Report. A study prepared for the European Commission DG Communications Networks, Content & Technology.

Witkowski L. (1995). *W stronę ponowoczesnej teorii i praktyki edukacji (inspiracje Baumanowskie).* In: A. Zeidler-Janiszewska (ed.), *Trudna ponowoczesność.* Poznań.