Virtualized, Personalized and Ubiquitous Learning in Post-Industrial Society

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The paper deals with an interrelation between social and cognitive phenomena associated with transition of the society to the post-industrial epoch. Ideas triggered our study came from two different fields: sociology and epistemology. From the sociological point, we consider the Post-industrial society as a virtual society, where artificial interfaces more and more separate individuals from the real social environment. In our study, we consider three trends: Virtualization, Personalization and Ubiquitous Learning as the main trends of the Post-industrial society education by using a so-called social constructivist approach as described in several studies (Feenberg, 1999; Peters, 2006), basing technology research on two principles: historicism and hermeneutical constructivism. In terms of historicism study we emphasize three stages in development of the human society: Pre-Industrial, Industrial and Post-Industrial Society (Ivanov, 2006 and Levin and Kojukhov, 2009) and locating the three educational trends in each stage.

The Pre-industrial society is characterized by experience-based or handicraft technology. Such technology corresponds to non-formal, intuitive, creativity-based education. In the pre-industrial society, affected by religious vision of the world and by lack of scientific knowledge, the objective reality is widely substituted by virtual reality in order to explain all unexplained or unusual events. Due to low level of development of communication means, the phenomenon of ubiquitousness appears only on the level of myths and dreams.

The Industrial society started with the Age of Enlightenment was (and is) a society with a advanced social structure. The Industrial epoch is associated with macro-technologies (De Vries, 1996), where the fundamental theories are the classical ones. The macro-technology

was one of the triggers of formal education. Though appearance of new communication means has connected individuals with each other, they did not significantly affect access of individuals to the learned content.

The Post-industrial society is a society where the manufacturing gradually loses its central role; the economy gradually becomes service-centered. This society loses its "real" character and becomes a kind of virtual society. Such a phenomenon is called virtualization where the reality becomes more and more virtual.

Virtual Reality (VR) is also associated with Post Modern simulacra (Bell, 1973 and Baudrillard, 1994)). Post-modernism claims no clear difference between reality and an imaginary world. The Reality rather becomes substituted by simulacrs. The real world loses its traditional sense and appearance. Individuals communicate with the real world by using multi-media means. This leads to a new phenomenon – Ubiquitous reality. Events of the social life are mostly generated by informational means (internet and TV news agencies) and become virtual. All social institutions are substituted by VR. The VR in the Post-Industrial society may also be considered as a new form of implementation of the human activity in building the new knowledge, and an extension of the real world frontiers. It transforms reality into the new context – the form of simulated reality (Klikushina, 2009).

Main educational trends in historical view are summarized in the following table.

Society	**Technology**	**Education**	**Educational Trends**		
			Virtualization	**Ubiquitous**	**Personalization**
Pre-Industrial Early Idealist	Handicraft	Intuitive, Informal, primitively creative	Virtual Reality is associated with any unusual	Direct connection teacher - student	Personalized education is the form of early individualism

Industrial Materialist	Macro-technology Linear models	Common Formal	VR is substituted by clear image of the reality	Direct Teacher – Class	Globalism
Post-industrial Mixed	Micro-technology Non-linear models	Informal Creative	VR is created by human	Fully Ubiquitous	Personalized

Summarizing our historicist analysis and based on the data gathered in the table one can see that the education developing curve (as well as most of its main trends) is a dialectical spiral. For instance, the education in the Pre-Industrial stage is primitively creative and informal, then transits to its formal globalist state in the Industrial stage, and finally, when the society goes to the Post-Industrial stage, the education returns to the informal creative state but in the higher level of its development.

After suggesting that Virtualized, Personalized and Ubiquitous education is most applicable for the Post-Industrial epoch we then try to find the most applicable philosophy of technology that gives the best answers on today's educational demand.

When analyzing different approaches to philosophy of technology we distinguish various theories, based on the Humanitarian approach by using the mapping as proposed by Feenberg and Peters (Feenberg, 1999 and Peters, 2006). The theories differ with respect to the role of human action in technology domain and the neutrality of technical means (see the table below).

	Autonomous	Humanly Controlled

Neutral complete separation of means and ends	**Determinism** Marx e.g. Traditional Marxism	**Instrumentalism** Papert liberal faith in progress
Value Laden means form a way of life that includes ends	**Substantivism** Ellul Means and ends linked in system	**Critical Theory** Marcuse, Foucault Choice of alternative means-ends system

Deterministic theories, such as Marxism, minimizes human power to control technology development and consider technical means to be neutral, i.e. independent from natural needs.

Substantivism shares determinist scepticism regarding human power but considers natural social needs to be implicated by technical means.

Critical theories affirm human power and claim means and ends are linked in systems subject to human ultimate control.

A remarkable example of neutral theory is an approach developed by Papert (1993) that takes the form of computerized *instrumentalism* and offers children "powerful ideas" for problem solving.

From the epistemological point, we base our study on the constructionist approach, which consider individuals as active creators of their own meaningful micro-worlds. Since the virtualization alienates individuals from the reality, a role of science and technology education in post-industrial society seems to fall. In contrast, the focusing of individuals on creation their own environments leads to rise of deepness of science and technology education. In our study, we discuss this imaginary contradiction and show that constructionism can be

considered as a predecessor of virtualization. Moreover, many features of the phenomenon of virtualization can be explained on the base of the constructionist approach. One of the main contributions of the paper is verification of the fact that these phenomena have deep roots in Seymour Papert's Instrumentalism (Papert, 1993). Indeed, the Post-Industrial eduaction trends that we proposed above well match with Papert's ideas.

Virtualization is mostly social phenomenon rather then technical and it is much alike Papert's concept of micro-worlds which may be considered as predecessors for the concept of Virtual Society. Personalization and grow of creative component in students learning also have roots in Papert's work. S. Papert was one of the pioneers who proposed the individual approach as dominating in his educational program. Creativity is the central idea of his Constructionist approach based on putting the constructing of students mental models in the focus of the educational process. According to Papert, the student teaches computer by creating his own individual environment by himself.

Besides the above, the ubiquitous learning concept is the newest trend connected with the latest developments of mobile broadband technologies and creating of multiple social communities allowing students to be always connected to the learned content and be part of education related forums. Taking also into account that the education technology is more and more becoming a part of our life, we suggest enhancing Papert's instrumentalist student centered concept by proposing an approach of creating an alternative Ubiquitous Personalized Learning Environment (Yang, 2006 and Kojukhov & Levin, 2010).

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