Virtualization and Educational Technology in Post-industrial Society

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Abstract

The paper analyzes the position and trends in development of Technology and Education in Post-industrial Society. Three historical periods of the Human Society – Pre-Industrial, Industrial and Post-Industrial - are considered in correspondence with three types of Technology from the one hand, and with three types of Education from the other hand. The paper demonstrates the trend of domination of the non-formal education in the post-industrial society.

Keywords: Information society, Virtualization, Education, Technology

1. Introduction

The changes, which continue affecting the present society, are on both the structural and the substantial levels. Mainly, the changes are likely to be associated with the phenomenon of computerization and the related phenomenon of much more extensive consumption of information. Indeed, no one of recent technological breakthroughs or latest developments in the society, can be compared with these phenomena in terms of social consequences. The opinion that the computerization is the actual reason and source of the recent developments in the society seems to be intuitively correct.

This concept about the role of computerization has obtained a scientific interpretation in the form of a notion that the Industrial society moves towards its new state being called the information state.

The majority of researchers [1, 2, 3, 4] determine a number of attributes that highlight the post-industrial society. The information society may, according to the majority of researchers, be characterized by a) transition from the Capital-centered society to the Information-centered society; b) transition of social conflicts from the economic sphere to the cultural sphere; c) the antagonistic conflict between “rich people” and “poor people” is replaced with a newly dominating conflict between “informed” and “non-informed” people; d) the information infrastructure becomes dominating over the economic infrastructure.

However, some authors call into question the above conceptions, which seemed quite obvious. For example, D. Ivanov [5, 6] rejects considering the post-industrial society as the information society. He introduces an alternative

concept of so-called "virtualized society". According to the Ivanov's approach, computerization is a secondary phenomenon of the primary one, which is the phenomenon of virtualization. While the computerization is a technological phenomenon, the virtualization is a social one. However, the computerization in the present society has actually lost its technological aspect and has become a social factor, in its turn. Realizing of that fact is extremely productive. Whenever the central role of the social factor of computerization is realized, it allows re-considering some events in the present society, related to its transition toward the post-industrial society.

In this paper, we use the concept of D. Ivanov as a reference point and develop it by trying to comprehend the present education and the present technology in their mutual co-existence and interaction. We will discuss the three technology types suggested in [7] in the historical context, by putting into correspondence to each of them a suitable stage of development of our civilization. According to the approach proposed in our paper, the modern virtualized society exists in the world of micro-technologies. Comprehension of that situation allows making some conclusions about necessity to change basic approaches in education in general and in the technological education in particular.

We also use the concept of three technology types introduced by De Vries in [7]. We point out the conformity between these types of technology and the corresponding Society stages, and parallelism of their transition principles.

The main contribution of the paper could be seen in revealing and demonstrating the fact that one of the typical features of transition from one type of technology to another is changing ratio between the formal and informal (creative) components of the contemporary education. In this paper, we present a forecast of the main trend for development of education in the post-industrial world. In short, this trend is actually in the increasing role of the informal component and, consequently, transition to the principally new pedagogical paradigms.

2. Preliminaries

In this section we recall some concepts that are used in the paper. When talking about the features of the present Society in comparison with previous societies we use the concept *reification*.

Reification (in Philosophy) - the consideration of an abstraction or an object as if it had living existence and abilities; at the same time it implies the materialization of social relations.
An antonym of the above concept is called *de-reification*.

De-reification or Virtualization – the process when human essence is transferred into not social, but virtual reality, in which one deals not with things, but with simulations (images).

The dialectic idea is that history progresses in stages of social development where the driving force is the negation of a previous social stage by a new social stage. According to this widely accepted social theory, we consider the three stages in development of human society: Pre-Industrial, Industrial and Post-Industrial Society.

Pre-industrial society refers to specific social attributes and forms of political and cultural organization that were prevalent before the advent of the industrial revolution and the rise of capitalism. Some features of the Pre-industrial society: limited production, limited communication between human communities, absence or primitive level of basic institutions: school, university, science etc.

Industrial (Modern) society started with the Age of Enlightenment, refers to a society with a modern social structure. Such a structure has developed in the period of time following the industrial revolution. Manufacturing and mass-production required new predefined and formalized social relation and, as a result, creation of corresponding institutions. The main feature of the Industrial Society is the phenomenon of reification. Extraordinary reification of the Industrial Society leads to forming social institutions (market, monetary system, manufactory, school, university) – universal and abstract standards that regulate human life. Such standards transform the human life into a system of social roles and bring the Society to the great ideas of Freedom and Progress [5].

Post-industrial (post-modern) society is a society where the manufacturing looses its central role, economy transforms into a service-centered economy, importance of government and state institutions decreases. It is the society of a diffusion of national and global capital, and mass privatization. The Post-industrial society looses its “real” character. The society gradually "de-reificates", thus becoming, at its considerable extent, a virtual society. Such a phenomenon called virtualization is discussed in the next section.

3. Virtualization of Society

For adequately understanding the main phenomenon of the present society – i.e., the computerization - one should accept that pure computation has a lower priority in the society, than computerized simulation.

So, computerized simulations have introduced the very phenomenon and many practical examples of virtual reality in our everyday life, and they become a replacement of real events and real human actions. Presently, a lot of commonly accepted and respectful institutions of the society are transforming into their virtual form and, actually, are de-materializing. In view of the above, one may speak about the Post-Industrial era as about an era of de-reification.

In such a manner, the society in its traditional form is gradually substituted by the virtual society. A simulation being a virtual analog of a real social interaction implements interaction between a human and the society. Computerized simulation of institutions has become a characteristic feature of many types of virtual interaction: for example, of virtual communities, virtual

corporations, virtual entertainments, virtual crime and virtual release of sins as well.

The intensively increasing use of virtual reality based technologies during the recent years has a social meaning, namely – the replacement of the social reality with its computer simulations. The social aspect of the developing computer technologies clearly prevails over the technological aspect. Once the social meaning of developing technologies of virtual reality is recognized, it definitely brings researchers of the present society to the idea of explaining social processes using the phenomenon and the term virtualization.

One may speak about **virtualization** (de-reification) of the Post-Industrial society [1, 2]. In a virtual reality of any kind (economics, politics, science, education) a person deals not with a real object, but with a simulation/image [5]. A person who finds himself/herself in a *social reality*, takes it seriously, perceives it like something naturally given which he/she has to live in. A person immersed in a **virtual reality** enthusiastically plays in it, realizing its conventionality, conditionality of its parameters and the possibility of quitting it.

In the Post-industrial society, other social phenomena are also simulations of institutional norms/roles performance.

a. **Economics**. Images of consumer values, and not real things, circulate in the Post-Industrial market. The very economic process, i. e. value production leaves design bureaus and assembly lines and is transferred to marketing departments, agencies, media studios and so on. It is economical predominance of images that provokes an unprecedented expansion of speculative stock market that turns in a self-sufficient industry. The credit system makes solvency not so much a function of possessing real assets as a function of image of financial trustworthiness that both individuals and financial institutions functionaries can simulate. The virtual production, virtual corporation, and virtual money allow making computer networks the main means and environment for economic activities.

b. **Politics**. Under the Post-Industrial conditions, the fighting for power is more and more waged in the form of TV debates and advertising. Rating and image-makers, press secretaries, and part-time recruited show business stars put back the political party functionaries. Power becomes a function of a political image. The very political process leaves party and government sessions, where programs are developed, administrative functions are assessed and controlled. The politics of today is made at the mass media studios, in PR agencies, and on the show stages.

c. **Science**: Virtualization of knowledge – manipulation with models, material experiment is substituted by model experiment, verification is replaced by finding alternative model, empirical research is replaced by speculative research. In science of the end of XX– beginning of XXI century, a tendency of the theoretical pluralism dominates. A well-known slogan of a methodological anarchism “anything goes“ is accepted and considered as

a multi-paradigmatic principle. In the Post-Industrial era, the scientific truth, that was the absolute principle in the Industrial Society, relaxes and becomes doubtable.

Obviously, such components of the social life as technology and education are also affected by general tendencies of the Post-industrial Society. It is the subject of next sections of our paper.

4. Technology and Education. Stages of Development

Marc De Vries in 1998 [7] proposed to identify at least three different types of technologies: *experience-based technologies*, *macro-technologies* and *micro-technologies*.

Historically, the *experience-based* or *handicraft technology* is the technology known in the Human Society from very initial stages. The handicraft technology corresponds to a non-formal, intuitive, creativity-based education. On the handicraft era, teachers transfer their knowledge and skills to students in individual non-formal manner. The “art of teaching” is extremely important element of the handicraft technology, where the role of science is limited to knowledge of natural phenomena that was gained by experimentation and not by deriving it from fundamental theories.

In *macro-technologies*, the fundamental theories are the classical ones (mechanics, thermodynamics and electromagnetic) that are all concerned with macroscopic structures. The macro-technology corresponds to the formal education. On this stage of the development, the teacher actually becomes the teacher in a modern sense of the word. The main content of the education contains formal methods, approaches, principles, algorithms etc. All the methods are well formalized and symbolically described. There is a total symmetry between the knowledge and its formal representation. Education in the macro-technology era becomes the clear process based on formal principles. The non-formal, intuitive, creative component appears within the curriculum in very anemic form and is not considered as a subject of teaching.

The *micro-technologies* are nowadays technologies, which basically form the basis of the Post-Industrial Society. The micro-technologies correspond to non-classical science phenomena. In micro-technologies the clear correspondence between science and technology is absent. Traditional science and education meets significant difficulties in the case of micro-technologies. Innovative methods for teaching and learning micro-technologies require innovative and sometimes non-formal approaches.

In our paper, we denote that conformance exists between the above-mentioned Society stages and the technology types proposed in [7]. This conformance allows formulating the main characteristics of education in the Post-Industrial society

The experience based or handicraft technology dominates in the Pre-Industrial Society where the most important driving force is primitive creativity

based on individual experience. The technology education of the Pre-Industrial Society is oriented to the experience-based learning, and is characterized by a primitive vision of the world, the absence of a formal curriculum, and absence of formal methods both in the teaching methods and in the subject matter. Creativity plays the key role in the Pre-Industrial technology education.

The macro-technology is the technology of the Industrial (Modern) Society. The macro-technology dominates since the Enlightenment age. The base of the macro-technology is the strong conformance between technology and science. The concept of Technology in the Industrial Society may be defined as "Applied Science". The most important paradigm of the Technology in the Industrial Society is Formalization. According to the Formalization paradigm, any obtained knowledge or scientific data can be formalized. Any non-formal, non-exact and, consequently, more sophisticated methods of interpretation of the science data are unpopular.

According to the macro-technology concept:

- The world is the objective reality. The concept of Applied Science is actually a synonym definition of Technology. The Applied Sciences become major sciences.
- The majority of problems are solvable by applying relevant formulae or mathematical models. The world is perfectly organized, describable and understandable since it may be formalized by using simple linear mathematical models. Linear models are simply formalized and taught as well.

The domination of linear models determines both the technological and the educational achievements of the Industrial Society. Moreover, the major components of Education in the Industrial era (i.e., curriculum, teaching, learning, and even learning environment) have a trend to be formalized.

The technology of the Post-industrial Society can be classified as micro-technology (or high-tech technology). In contrast with the macro-technology, which is based on formalization as the main paradigm, the micro-technology, being a technological platform of the infrastructure of virtualization, stimulates Creative components of the human life. The formalization looses its central role as a main educational activity. As a result, the post-industrial education seems to become the mostly informal, creativity-oriented education. It seems that the Industrial Society and the corresponding macro-technology era (that were extremely pragmatic and formal methods-oriented), step aside to give a place to a new Post-Industrial Society, which has a trend to become informal, non-pragmatic and, consequently, more “human-oriented”. Some new principles will play an important role in the epoch of micro-technology. They will be outlined in the next paragraph.

5. Technology Education in Post-Industrial society

As shown in the previous clauses, the traditional technology education faces significant difficulties in the case of studying micro-technologies. Modern methods for teaching and learning micro-technologies require innovative and non-formal approaches.

As mentioned above, the Post-Industrial society is a Virtualized society. In a virtual reality of any kind (e.g. science, education) a person deals not with a real object, but with a simulation/images. A person immersed in an educating **virtual reality** enthusiastically plays in it, realizing its conventionality, conditionality of its parameters and the possibility of quitting it. Based on the concept of Virtualization and taking into account the global computerization, an innovative and completely person-oriented educational environment is proposed. On the one hand, this is a powerful computerized simulation tool and, on the other hand, it allows emancipating individual students from their troubles and shames, which would be non-avoidable in a conventional learning environment. This tool may be considered as an educational tool that supports developing creativity of individuals.

6. Conclusions

In the paper, we analyzed the reasons and features of correspondence between the human society, technology and education. We claimed that the present society is a society of reification, which is characterized by fundamental changes in all parts of life while moving into the so-called “virtual life”. The today’s society becomes more and more virtual (society of de-reification) with domination of virtual reality in all areas of social life. This new reality significantly affects education. Virtualization emancipates humans by freeing them from many formal activities, so that creative activities of humans become dominating.

The Post-Industrial education has the character that is much less formalization-focused than that of the Industrial age education. It becomes non-formal centered, and, as a result, requires innovative, creativity oriented approaches for teaching, learning and developing curriculums.

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