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MULTIMEDIA DIDACTICS FOR A KNOWLEDGE SOCIETY

Milan Matijević
University of Zagreb, Faculty of Teacher Education
Zagreb, Croatia
milan.matijevic@ufzg.hr

Summary – It is considered that television as a medium presented a great incentive for change to the global political movement in 1968. In those years, television achieved a notable level of power in terms of its informative, educational and political activity.

At the end of the 19th century and the beginning of the 20th century, the communicative power of books was at its peak. At that time, the world saw the appearance of cars, aeroplanes, the telephone and the radio. This was a large boost for industrial development, which also caused great changes and new trends in the field of education, known under the term "pedagogy reform projects and movements".

In the last ten years, the media environment has been marked by ICT. The Internet and multimedia, mobile phones, and satellite and cable TV could also all be placed within this context. Transport has reached an enviable technological and technical level. This (multi)media complex has strongly affected the philosophy and didactics of education. School, through its internal and external organisation, is increasingly struggling to meet all the expectations of the social community which perceives knowledge as a significant variable of the quality of life. In such a technological environment, knowledge becomes the most important variable of the quality of life. Knowledge is seen as a product to be manufactured and sold.

In view of the above, various questions may be raised: do we need another pedagogy reform movement? What kind of *knowledge* does a *knowledge society* require? What changes are needed for traditional didactics, which offered scientific explanations for events that formed the process of instruction and education?

The author sees multimedia didactics as a scientific framework for teaching the process of generating, transferring, acquiring and trading in knowledge.

Key words: knowledge, knowledge society, ICT, new media, Internet, multimedia didactics

Introduction

The purpose of any science is to explain certain occurrences, processes, relations or phenomena in a particular area. Based on such explanations, science can regulate particular relationships and foresee future events.

Scientific explanations result in scientific theories, definitions, classifications, theorems, formulas, etc. An important place in any science is taken by concepts that designate basic phenomena or occurrences. Thus, we can observe concepts that are part of the scientific terminology of a particular science or scientific branch (for example, pedagogy, didactics, sociology, etc.), but also concepts that appear in a number of different sciences and scientific areas. The concept of KNOWLEDGE is one of the concepts that can be found in all sciences – natural, social, technical, information, etc. The problem lies only in the fact that in all these sciences, the content and scope of the KNOWLEDGE concept is not unambiguous. Thus, scientists use this term in computer science, economics, communication science, sociology, technology or pedagogy with different content definitions. This causes certain redundancies and misunderstandings. Furthermore, we can also find different definitions of KNOWLEDGE even in the sciences of the education process, for example pedagogy, psychology or sociology. This is the result of the attempt to explain as thoroughly and operationally as possible an important social phenomenon – KNOWLEDGE – which has accompanied man since ancient times. Therefore, different scientific theories have emerged, attempting to explain the process and results of learning, in other words, the results of people's education and life.

In Croatia over the last half a century, education and learning theories, and the related definitions of the basic concepts, have been under the various influences of Russian, German or American scientists (and scientific literature). This observation derives from any analysis of the definition of the KNOWLEDGE concept in scientific texts.

Knowledge has become a much more important variable in people's lives at the beginning of the third millennium than it was a hundred or more years ago. Therefore, this concept is connected with a large number of everyday situations, but, unfortunately, it lacks logical and scientific clarity. Thus, recently, we have heard that knowledge is *produced* and *sold;* we hear talk about *a knowledge enterprise* and about *a knowledge society.* Knowledge can be *managed,* and we also hear about *knowledge workers* and a *knowledge economy* (Bogdanović, 2007). To what extent do the newly-coined linguistics syntagms, such as knowledge society, knowledge economy, knowledge workers or knowledge management conform to scientifically based explanations of the *knowledge* phenomenon? To what extent is the concept of *knowledge* in these linguistic expressions unambiguous or clearly defined and explained?

The significance of defining the concept of KNOWLEDGE and related problems

Let us look at some definitions of the concept of knowledge which have been prominent in recent years and decades in Croatia and around the world.

For a long time, the following definition by the well-known didactician Vladimir Poljak was predominant in Croatian pedagogical literature: "Knowledge is a system or logical compendium of facts and generalisations about objective reality, which man has acquired and permanently retained in his consciousness" (Poljak, 1970, p. 6). The same author went on to

specify the previous definition of *knowledge*: “The quality of knowledge may vary, which depends on the degree of acquisition of facts and generalisations. Thus, in terms of quality we can make a distinction between several degrees of knowledge: recollection knowledge, recognition knowledge, reproductive knowledge, operational knowledge and creative knowledge” (Poljak, 1970, p. 9). Experts objected to the first definition for its insufficient stress on the applicative value of acquired knowledge, which the author defended by highlighting operational and creative knowledge as important and valuable qualities of acquired knowledge. The quoted definition is to a large extent transparent in considering Bloom’s concept of knowledge and the cognitive dimension of learning in his famous taxonomy of learning objectives (Bloom, 1956).

The definition given in one of the more recent university pedagogy textbooks (Mijatović, 1999) rests on similar theoretical foundations. There, knowledge is defined as the result of learning, a personal inventory of information and skills that an individual has acquired, appropriated and kept, with a view to using it throughout his or her practical life; active, creative, critical, innovative understandings have more value since they enrich personality, boost a person’s activity potential and enhance his or her living standard (Mijatović, 1999, p. 655).

Although they occupy a prominent place in recent pedagogical literature, there could be various objections to the above definitions, ranging from (lack of) clarity and (un)ambiguity to their scope and applicability. Namely, the above definitions take insufficiently into account the understandings of education and learning and the theories or scientific explanations of the processes and phenomena which are closely related to the phenomenon (concept) of *knowledge*. (It is easy to notice that in communication the concept of knowledge is often identified with the concept of information).

The works of B. Bloom (1956) and R. M. Gagne (1970 and 1996) have had great influence on psychology literature in Croatia. Thus, N. Pastuović (1999) explains Gagne’s system of individual types of knowledge depending on their transfer value: verbal information, intellectual skills and cognitive strategies. The definition of the concept of knowledge in the Psychology Dictionary lies on the same theoretical foundations where knowledge is defined as a cluster of organised information held by an individual, group or culture. Different kinds of knowledge can be identified, but in psychology knowledge is most frequently classified as declarative or procedural. Declarative or conceptual knowledge is knowledge about occurrences and processes which may be explicitly expressed. Procedural knowledge is knowledge about how to do something; it is implicit, we express it through behaviour, and it cannot easily be expressed in words” (Petz, 2005, p. 558).

As mentioned earlier, an important place in pedagogical literature in relation to the definition of the concept of *knowledge* was certainly held by Bloom’s taxonomy of educational objectives (Bloom 1956). This classification shows, as does the quoted definition by Croatian authors, that it is not simple to say what *knowledge* is, that knowledge cannot be identified with the content of the concept of *information*, and that it is important to observe the quality levels of knowledge, or the cognitive competences that a person can show. Bloom et al. (1956) presented it in the following manner:

1. *Knowledge:* recognise or recall information.
2. *Comprehension:* demonstrate that the student has sufficient understanding to mentally organise and arrange material.
3. *Application***:** a question that asks a student to apply previously learned information to reach the answer. An example of this is solving a maths problems expressed in words.

4. *Analysis***:** higher order questions that require students to think critically and in depth.
5. *Synthesis***:** a higher order question that asks the student to perform original and creative thinking.
6. *Evaluation:* a higher level question that does not have a single correct answer. It requires the student to judge the merit of an idea, a solution to a problem, or an aesthetic work. The student may also be asked to offer an opinion on an issue.

Concerning the above, it is interesting to recall one of the more recent attempts to adjust and improve Bloom's taxonomy (Anderson and Krathwohl, 2001). Bloom's followers made a connection between Bloom's and Gagne's teaching on knowledge, or on what may be described as the result of learning in the cognitive domain (see Tables 1 and 2). Anderson and Krathwohl (2001, p. 28) relate any subcategory of the result of learning in the cognitive domain with cognitive dimensions, or with the level of cognitive activities that may emerge as the transfer value of a learning result. In this way, even factual knowledge implies a certain degree of understanding, a certain possibility of application, and different opportunities for critical evaluation and for a creative relation towards such knowledge (for example, the reorganisation of factual knowledge into new structures and models). Furthermore, various metacognitive activities in determined subjects are possible with any dimension of the cognitive process (memorisation, understanding, application…). It is precisely here that all the complexity of the *knowledge* phenomenon, or of what is the result of learning in the cognitive domain, emerges once again.

What is important to stress from the pedagogical point of view is the understanding that the human brain does not have to be used exclusively or mainly for keeping information or for memorising scientific information and human experience, because some apersonal media (ranging from books to CDs, DVDs, or the hard disk of any computer) can do this much better. However, where people, or their brain, have the advantage is in the various cognitive (or metacognitive) activities accompanying this information and scientific understanding.

The dilemmas concerning this issue are discussed by Jacques Delors et al. (1998). They see four basic pillars as important features of lifelong learning: learning to *know*, learning to *do* (act), learning to *live together* (live with others), and learning to *be*. Therefore, it is not only important to learn *something*, but also to learn *how* and *why*. Today, it has been established that even some animals can learn information or skills just as well as people, but what makes people different from animals is their capacity for critical thinking and assessing what they do, as well as the capacity to creatively alter their behaviour, depending on the situation and the problem that arises under the influence of various factors.

From a pedagogical and didactic perspective, there are many scientifically relevant and complex questions that arise. We are particularly interested in how to acquire knowledge and the related cognitive competences and how to develop them in the new (multi)media environment. How and what can we learn with the help of powerful media (hypermedia), such as computers, the Internet, multimedia, cable and satellite TV, etc?

Table 1: The Taxonomy Table

THE KNOWLEDGE DIMENSION	THE COGNITIVE PROCESS DIMENSION					
	1. REMEMBER	2. UNDERSTAND	3. APPLY	4. ANALYSE	5. EVALUATE	6. CREATE
A. FACTUAL KNOWLEDGE						
B.						

CONCEPTUAL KNOWLEDGE						
C. PROCEDURAL KNOWLEDGE						
D. META-COGNITIVE KNOWLEDGE						

Source: W. L. Anderson and R. D. Krathwohl (eds) (2001) p. 28

Table 2: The Knowledge Dimension

MAJOR TYPES AND SUBTYPES
A. FACTUAL KNOWLEDGE
A.a Knowledge of terminology A.b Knowledge of specific details and elements
B. CONCEPTUAL KNOWLEDGE
B.a Knowledge of classifications and categories B.b Knowledge of principles and generalisations B.c Knowledge of theories, models and structures
C. PROCEDURAL KNOWLEDGE
C.a Knowledge of subject-specific skills and algorithms C.b Knowledge of subject-specific techniques and methods C.c Knowledge of criteria for determining when to use appropriate procedures
D. METACOGNITIVE KNOWLEDGE
D.a Strategic knowledge D.b Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge D.c Self-knowledge

Source: W. L. Anderson and R. D. Krathwohl (eds) (2001) p. 29

Multimedia didactics for a knowledge society

In the last ten years, the media environment has been marked by ICT. The Internet and multimedia, mobile telephones, and satellite and cable TV may also be placed within this context. Motor vehicles have also reached an enviable technological and technical level. This (multi)media complex and the means of transport of people and goods have a strong impact on the philosophy and didactics of education. School, through its internal and external organisation, finds it increasingly difficult to satisfy the expectations of the social community where *knowledge* is an important variable in the quality of life. In such a technological environment, *knowledge* has become the most important variable in the quality of living. Knowledge is viewed as a good which is produced and sold, and which is used for resolving the problems of everyday life.

We must agree that the development of modern communication media has also greatly contributed to the significance of the phenomenon and concept of *knowledge*. ICT has allowed for an optimum systematisation of the knowledge to which mankind today has access, but at the same time it has opened up unlimited opportunities for processing and transferring information about that knowledge (or knowledge that can be shown as information). All this has also led to a change of relationship towards knowledge as such, but also to a need to change the manner of acquiring this knowledge. The previous brief discussion on the problems of defining and scientifically explaining this significant phenomenon indicates that there is a need to elaborate knowledge acquisition strategies, or learning strategies, in a different way.

Experts in the organisation of education and schools have observed that traditional didactics, and the theories developed by those didactics, could not meet the requirements of an efficient education and learning organisation in step with the times. The new communication media and modern means of transport for people and goods require more efficient, flexible and more suitable didactic models from those that existed in the last two or three centuries. Traditional education technology which complemented or facilitated teaching and lecturing cannot satisfy the needs of the lifelong education of a person who lives in a knowledge society at the beginning of the third millennium.

The media environment, the philosophy of living, and understanding the role of knowledge in a person's life and in the operations of a company and the state bring about great changes in the philosophy of education and in the concept of the school for the future. We will probably have to critically review the place and role of collective teaching in classes of thirty students and schools of, sometimes, over a thousand students. Such a social framework cannot meet a person's learning needs and ensure individual progress. More than in the previous century, the stress will be on individual and individualised activities for all learners. This individualisation and individual educational activities will to a large extent be facilitated and enhanced by the new media, first of all PCs, the Internet and television. Here, we are not only thinking of learning in school, during the classroom process, but also all other forms of non-formal and informal learning which take place throughout a person's life.

The powerful ICT has already found its place in the teaching process, but also in our homes. An alternative virtual school takes place in our houses and homes, which strongly affects informal learning and the development of the individual. The future of learning should be perceived in terms of e-learning and m-learning (mobile learning) (see: Keegan, 2002).

This means that young people and adults already learn a great deal with the help of electronic media, not only at school, but also in all the places where life and work happen. Thus, we hear of new meaning being attached to the acronym www: whatever, whenever, wherever (March, 2006).

Learning, understood and organised in this way for young people and adults, gives rise to many organisational questions which traditional didactics can neither answer nor explain. A new type of didactics has emerged, and among the first to observe it was the German psychologist Ludwig J. Issing (1994). Besides giving the name of multimedia didactics to this new scientific discipline dealing with learning in the new media environment, German experts also suggested the name e-Learning didactics (Ger. eLearning-Didaktik, see: Arnold und Lermen, 2006).

The tasks of the traditional school, concerning the content and method of learning, must speedily and significantly change. School has to develop a new learning culture and teach students to learn with the assistance of the new media (Mitzlaff, 2007). In addition to schools, even preschool institutions must work on developing a culture of learning and living

with the new media (ibid., pp. 338-375). Even before starting school, children take into their hands various digital toys or everyday objects, such as remote controls for video or audio equipment at home). The fact that children encounter powerful electronic devices in their homes, kindergartens and schools shows how important it is to learn about ICT with the help of ICT (for more see: Bergmann, 2000, Issing and Klimsa, 2002, Jolliffe, Ritter and Stevens, 2001, Tulodziecki and Herzig, 2002).

Conclusion

An understanding of the ways of learning brought about by both the constructivist theory of learning and constructivist didactics (for more, see: Reich, 2006), accompanied by the conditions that have been brought about and imposed by the new multimedia environment in school and at home, will significantly change the roles of the main actors of the education process, in other words, of the process of learning and teaching: teachers and students. In general, the relationship of formal, non-formal and informal learning in forthcoming years will gain an utterly new place in school and in the life of individuals. Jacques Delors et al. (1998) also warn about this. The clear border between the days that children spend learning and in school on the one hand, and holidays and weekends on the other hand, will disappear. Learning in school and learning out of school will intertwine and complement one another. Therefore, it is essential to redefine didactics as the science about the organisation of learning.

Multimedia didactics, or e-learning didactics, is increasingly becoming representative of the scientific framework for studying the process of generating, transferring, acquiring and trading in knowledge within a knowledge society for a knowledge economy. Compared with the years we have left behind, this represents a major change which requires faster and greater changes in school than those we have seen so far (Matijević, 2007).

In the same way that media and communication changes had a great impact on the creation and course of projects and reform pedagogy at the beginning of the 20th century, the current development of the media and means of transport requires faster and greater changes in schools than the ones that are currently taking place, or have already been made. We can even speak of a new reform pedagogy movement to enable school and pedagogy to meet the needs and expectation of the knowledge society and the knowledge economy.

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MULTIMEDIJSKA DIDAKTIKA ZA DRUŠTVO ZNANJA

Milan Matijević

Sažetak - Smatra se da je televizija kao medij predstavljala veliki poticaj svjetskom političkom pokretu za promjene 1968. godine. U tim je godinama televizija dostigla zapaženu razinu snage u informativnom, obrazovnom i političkom djelovanju.

Krajem 19. i početkom 20. stoljeća knjiga je dosegnula vrhunac komunikacijske moći. U svijetu se u to doba javljaju automobili, zrakopolovi, telefon i radio. To za sobom povlači snažan razvoj industrije. To je uvjetovalo i velike promjene i kretanja u području školstva koji su poznati pod nazivom „projekti i pravci reformne pedagogije“.

Medijsko okruženje zadnjih desetak godina obilježava ICT. U taj bi se kontekst mogli staviti Internet i multimedij, mobilni telefoni te satelitska i kabelska televizija. I prometna sredstva su dostigla zavidnu tehnološku i tehničku razinu. Ovaj (multi)medijski kompleks ima jak utjecaj na filozofiju i didaktiku obrazovanja. Škola svojom unutarnjom i vanjskom organizacijom sve teže zadovoljava očekivanja društvene zajednice u kojoj je znanje važna varijabla kvalitete življenja. U takvom tehnološkom okruženju znanje postaje najvažnijom varijablom kvalitete življenja. Znanje se promatra kao roba koja se proizvodi i prodaje.

U vezi prethodnih konstatacija mogu se postaviti različita pitanja: Treba li nam novi pokret reformne pedagogije? Kakvo *znanje* nam treba za *društvo znanja*? Koje promjene treba doživjeti tradicionalan didaktika koja je nudila znanstvena objašnjenja za događanja u procesu nastave i obrazovanja?

Autor vidi multimedijsku didaktiku kao znanstveni okvir za proučavanje procesa stvaranja, posredovanja, stjecanja i trgovine znanjem.

Ključne riječi: znanje, društvo znanja, ICT, novi mediji, Internet, multimedijska didaktika