

MEDIA AND CULTURE AS CIVILISATIONAL CHALLENGES FOR BIOLOGY AND ENVIRONMENTAL EDUCATION

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Abstract

Education should be viewed as supporting students in learning to use the tools for formation of meanings and constructing reality in order to better adapt to the real world. The article is devoted the changes in thinking of biology education according to civilization challenges: media and culture. The different theories which show for the reason for the crisis from one hand and speed development of civilization from another have been presented in the article. Research issues have been focused around the question: What educational strategies should one accept in the face of such state of thing?

While verifying the research hypothesis assuming that biology teachers should initiate scientific dialogue and create a certain bridge between science and the society first in connection with social aspects of the new forms of communication among others ICT tools were used. The survey research among secondary school students, biology students and teachers was conducted. The results of pedagogical observation aiming mainly at the analysis of processes connected with mass media aided biology teaching and learning also play a very important role. Conclusions drawn from research results and literature allowed the elaboration

priorities for biology education in the contemporary world of media.

Key words: *biological education, culture, media, social changes.*

Introduction

Variety of information carriers affects the number of communication's forms and meanings which serve both expression and impression and which played and still play the basic role in social life and in culture. Goban-Klas (2005) considers symbolic items such as reliefs, sculptures, paintings, clothing, perfume and sounds created with the help of simple instruments to be the earliest media, and any new medium is connected with exceeding the boundaries of sensory experience achieved by earlier media, which leads to transformation and enriching human experience.

Currently the media are ever-present. The teacher must be aware of the influence of outside school interference and psychological barriers related to the communication process.

Mass media and hypermedia shape new patterns and new values, their influence may be

associated with the theories of classical effects of mass communication. There are quoted psychological, sociological and cultural theories (Gajda, 004). Among psychological theories the following are worth mentioning: 1/ conditioning theory and 2/ theory of cognitive dissonance.

According to the first of the mentioned theories, stimuli associated with specific emotional states, they become an active factor organizing human action; however, it is in contradiction with psychological views on attitudes, filters in the assumed views. The latter explains the phenomenon of resistance to reception of information contradicting the recipient's attitude. Both psychological theories emphasize the influence of external and internal factors on the effects of communicating. These factors may differentiate students' school outcome in biology in the situation of uncontrolled access to information of low educational value or information organized while skipping the basic principles of teaching (Potyrala, 2007). Among others, family and peers, and in the broader social system opinionating leaders or environments, like for instance church, have strong influence on the interpretation of contents transmitted by the media, according to sociological theories. The existence of such groups of reference may affect the modified influence of media of group members. It is also believed that weak content of educational elements in computer science education is conducive to spreading social permission to the existence of various forms of violence, increased aggression, increase in criminal rate, pathology and frustration (Siemieniecki, 2003).

In connection with the development of the media there are a lot of theories which show for the reason for the crisis from one hand and speed development of civilization from another. Some are sure that influence of environment for human existence is deterministic and the differences in human opinions are connected with the ways of communication. The classification of the media prepared by McLuhan (2004) is connected with their ability to appeal to emotion directly. Characteristic for *Gutenberg Galaxy* is in McLuhans' opinion lack of the skill of creating of full allusions of associating in distinction from more primitive world concentrated on word transfer. When 'the medium is the message' as the Internet in the time of global village, the contents which are passed, according to McLuhan, are less essential.

The development of the man's technosfer has according to Toffler (1985) the exact relationship from 'waves' of social changes. The media which are used in order to 'standardization of images' influence, according to Toffler, on creation of canons of behaviours and new changes force to continuous searching message or knowledge confronting with new situations. Technical progress permits however more often to replace the standardization by individualization and centralization by decentralization and to perceive the need of feeling of sense. It is the beginning of 'third wave': from global village to local society supported with progress of technology of communication.

All these problems find smaller or larger reflection in education. The worldwide problems how the costs of logging of energy and the degradation of biosphere, present in curricula create the feeling of membership to global village (that is concretely where?). Man's identity is shaped in global culture, which does not treat to no historical identity (Melosik, 2001). The creating the present identity takes place in more and more larger degree across visual (re)presentation of this identity in popular culture of type the MTV (Melosik, 1996). Question is born: What educational strategies should one accept in the face of such state of thing? And: Will 'cyber-students' of the new Millennium differ from students from the previous century educated on the basis of typical textbooks, in their ability to process information contained in the text and image – precisely and with understanding? (Prinou & Halkia, 2003)

Knowledge keeps becoming more and more extensive, teaching curriculums have become overloaded, biology and science education is becoming more and more superficial. The 'overheated' and synthetic announcements limit the intellectual effort and the critical thinking the pupils. General education has been perceived ace and review of selected knowledge. Mass medias prolong students' senses but instead of their participations in life they give feeling of 'second hand life'.

The model of Spencers' iceberg (Spencer, 1993) was very significant for the concepts of school evolution towards 'the learning organisation' or rather 'teaching to learn organisation'

(Potyrala, 2008). The top of the iceberg are knowledge and skills and they constitute qualifications (confirmed with different diplomas). What can not be seen and forms the base of the iceberg are: own personality conception, motive, effort, enthusiasm, values, standards, professional ethic and moral criteria. Only all these together decide about competence, which is so often given as the quality of school work.

Methodology of Research

The main aim of the research was studying the influence of media on students' opinions on environmental threats as well as teachers' opinions on teaching strategies.

The following research question was formulated: Chat educational strategies should one accept in the face of the cultural changes in the contemporary world of media?

While verifying the research hypothesis assuming that biology teachers initiate scientific dialogue and create a certain bridge between science and the society applying strategies of active information processing among others ICT tools were used.

The survey research among high school students, biology students and teachers was conducted. Altogether 60 secondary school students, 60 biology students and 60 biology teachers participated in the research. Students participating in the research attended the third grade of classes with regular curriculum.

The conditions of school's participation in the research were connected with the standards of schools' equipment (e. g. communication and information from the Internet, exploration and application of the ICT tools at the didactic process). The students were confronted with new biological and environmental contents as well as the ICT tools (chat, blog, forum and typical, educational computer programmes, websites) enabling its processing.

The students of Pedagogical University who participated in the survey research were in the third and fourth year of studies in the Biology Department specializing in teacher training. Teachers answering the survey questions have been randomly selected for the research from among the participants of postgraduate studies carried out by that University and from among a group of teachers from training schools.

As a pattern of the first part of research (I) the survey conducted in USA ten years ago regarding their attitudes and interests towards selected current issues of environmental protection, including the pollution, greenhouse effect and global warming was used. Second part of research (II) has been focused around the survey questions connected with the developing strategies supporting students in question asking and the effective searching for information, developing metacognitive strategies for individual construction of scientific knowledge structure. As a pattern of the second part of research (II) the survey conducted in Poland six years ago regarding the conditions of biological knowledge transfer was used. The same number of teachers participated in the research carried out in the 2002 and 2008 (60 persons).

The results of pedagogical observation (III) aiming mainly at the analysis of processes connected with mass media aided biology teaching and learning also play a very important role. 36 computer-aided biology lessons at high school level were observed in this part of research. During the pedagogical observation attention was focused on student's activities, in particular on: collecting information, interpreting, communicating, hypothesis posing and verifying, creating concepts and theory checking with IT tools use.

Results of Research

(I) As 10 years ago as today small number of students believe that 'environmental problems' are real future, small number are active for environment (Table 1, question I).

Table 1. Results of survey research (I) carried out in 1997/1998 and 2008. Source: Wirthlin Worldwide 9/98 (Question I), Princeton Survey Research/Pew Research Center 11/97 (Question II), CBS/ New York Times 11/97 (Question III), Gallup Organisation, CNN/USA Today 11/97 (Question IV). Research in 2008 was carried out at Pedagogical University of Cracow.

Questions		% of answers (1997-1998)	% of answers (2008)
I. Do you think of your- self as:	1. an active environmentalist	12	11
	2. sympathetic to environmental concerns but not active	57	45
	3. neutral	27	39
	4. unsympathetic to environmental concerns?	3	4
	5. I don't know	1	1
		Percentage saying they worry about the problem a 'great deal'	
II. Do you person- ally worry about these problems:	1. pollution of rivers, lakes and reservoirs	61	59
	2. contamination of soil and water by toxic waste	59	51
	3. air pollution	47	46
	4. damage to the earth's ozone layer	40	35
	5. 'greenhouse effect' or global warming?	24	15
III. Do you think global warming	1. is an environmental problem that is causing a serious impact now	28	20
	2. do you think the impact of global warming won't hap- pen until sometime in the future	51	63
	3. do you think global warming won't have a serious impact at all?	15	26
	4. I don't know	6	3
IV. We'd like your impression of what scientists believe about global warming. From what you've heard or read, do scientists mostly believe that it is not a serious threat, or are scientists generally divided on this issue?	1. Not a serious threat	6	10
	2. Serious threat	42	30
	3. Generally divided	44	64
	4. I don't know	8	3

Percentage saying they worry about the environmental problem a 'great deal' depends probably on feeling close, real threat (Table I, question 2) because the students still think that global warming won't have a serious impact at all or the impact of global warming won't happen until sometime in the future (Table I, question 3). What is interesting, the student can see more often that scientists are divided on this issue (Table I, question 4). So, can we thus claim that this knowledge is for students and teachers important indeed? Despite the feeling, that the global reality keeps shrinking, the 'global village' seem to be something really elusive for them (40%), they call their generation 'MTV generation' (60%), the computer network is visual representation of human identity ('the internet family', team 'grono', 'tribal bonds' are important for 50% of them), thanks to speed of transfer students have deep conviction about participation in creating mass culture, the cyberculture (32%).

(II) Quite differently than 6 years ago the biology students and the teachers understand the modern strategies of teaching and the teacher's role in didactic process (Table 2).

Table 2. Results of survey research carried out in 2002 and 2008 at secondary school level. Students (S) and teachers (T) participated in it.

Questions	% of answers (2002)		% of answers (2008)		
	S	T	S	T	
I. What type of students' activities are most important for undertaking discussion and expressing opinion on the fast progress in science?	1. brain storming	21	49	12	30
	2. metaplan	3	8	8	20
	3. delphi method	2	2	4	8
	4. data processing due to ICT tools	25	20	42	18
	5. I don't know	49	21	34	24
II. Do you think that application of diverse ways of effective communication during biology lessons is possible? If not, what are limiting factors?	1. teaching aids, lack of suitable equipment	30	81	22	60
	2. teachers preparation	5	8	14	15
	3. teachers attitudes and convictions	4	1	17	5
	4. students' attitudes and interests	2	9	33	12
	5. I don't know	50	--	4	--
III. We'd like to know your opinion connected with the teacher's role in the process of science and biology teaching & learning. Is he/she more as:	1. lecturer	63	45	33	40
	2. organizer	37	33	45	50
	3. facilitator	--	2	20	7
	4. creator	--	20	2	3
IV. What does it mean in your view the term: 'modern strategies of teaching and learning'?	1. transmission by the teacher of ready knowledge	13	30	6	27
	2. the teacher organizes conditions and situations enabling students independent knowledge acquisition through solving theoretical and practical problems	43	55	33	58
	3. directed at the organization of students' action regarding both manual and intellectual activities	28	10	31	8
	4. aims to develop emotional processes	16	5	30	7
V. Do you think that ICT tools in education can help in the process:	1. observation and searching information	64	50	34	52
	2. gathering opinions, judgments, concepts	36	37	35	42
	3. testing ideas, exchange of views, change of concepts	--	13	21	4
	4. application of rules	--	--	10	2

Active teaching techniques which were so popular some years ago, went out with fashion partly today and are replaced by the others. 'Computer boom' in teaching seems to be replaced by 'computer boom' in learning (Table 2, question 1). Still the main limiting factor is school equipment and a small number of computers which are available during biology lessons (Table 2, question 2).

Media as means for achieving teaching aims as regards the enumerated issues are pointed out by all the authors of curricula (Potyrala & Walosik, 2008). The pedagogical observation of biology lesson at secondary school level (III) allows the statement that students verify their hypotheses, in accordance with recommendations of authors of programmes teaching, mass media aided, most frequently computer multimedia, more often the favourite websites. Meanwhile, in spite of quick increase in knowledge and the huge progress in field of biological research, these 'hot medias' provide students with ready information containing elements not requiring decoding, simple images do not leave the place for freedom of interpretation and analysing the different aspects and points of view.

Educational tasks determine new styles of teachers' work and also their competences, showing that the effects of the course of didactic process depend on the teacher's awareness to a large extent,

on his or her way of understanding of the school's reality and the students themselves. It seems that teachers are not entirely aware of the existence of all these problems (Table 2, questions III & IV). 'Hot media' take over their responsibility (Table 2, question V). Students frequently simply copy the texts from the Internet or graphically attractive images (Table 2, question V). Media become identified with reality, what seems real is more important from what is real in fact.

The results of hypothesis testing that biology teachers initiate scientific dialogue and create a certain bridge between science and the society applying strategies of active information processing allow the statement that curricula meet new teaching standards and the teachers perceive the need of changes, however, their realization does not catch up the social and civilizational transformations.

Discussion

Result of the survey research (I) revealed a certain degree of non-knowledge of the surveyed on real environmental issues and their convictions on various researchers' opinions on the topic regarding the condition of the environment and its threats. The reason for such a state can for example be seen in contradictory medial news. For instance, 2nd May this year New York Times announced New Climate Model Predicts Global Cooling: 'global warming will stop until at least 2015 because of natural variations in the climate', 'global warming – no problem'.

One may also suppose that virtual reality can be understood literally in terms of physics as 'molecules which really do not exist but may come into being if they are provided with suitable amount of energy'. Thus virtual reality for some people is only a computer simulation which you can 'enter' and 'touch' but which does not exist in reality (Bednarek, 2006).

Teaching strategies applied by teachers (II) seem unsuitable for students – information users' needs. Analysis of subject and didactic literature allows stating that during lessons organized in transmission strategy teachers' activity prevails (about 68% of time) rather than students' (about 20% of the lesson time), and the rest of the time flows without specifically planned activities. It is so-called 'Flanders' two-thirds law' (Śnieżyński, 2005). Pedagogists suggest (Chomczyńska – Rubacha, 2003) a closer look at the communicative position of participants of class interactions. Biology education offers numerous possibilities for use of instructions directed towards such elements of metaknowledge as knowledge about problems and knowledge about strategies at lessons. Students also have some 'metaknowledge' acquired at earlier stages of education. And yet biology as a teaching subject causes numerous difficulties to many people. It may result from individual differences regarding preferences concerning cognitive strategies (Nęcka, 1994), abilities displayed in building two cognitive representations – structure of linguistic knowledge and structure of experience – knowledge about the world as well as the process of communicating which occurs in the specific situated context appointed by conditions that are external for both the sender and the receiver (Putkiewicz, 2002). These conditions include for example, the way of information transmission.

Observed students activity (III) revealed mainly in fluent communication and application of simplified ways of hypothesis verification with IT tools use can be the basis of analysis in hermeneutics which means aiming in interpreting various symptoms of human activity especially cultural in nature (Zajac, 2000). Education based on hermeneutic experiment is close to constructivistic learning and teaching, which in turn is close to problem teaching. In relation to situated learning theory (Lave & Wenger, 1991) cognition is understood as projection activity, and not representing the world with the help of symbols, any knowledge is contextually situated and it is largely dependent on the situation in which it is acquired. Hence, in the adopted educational concept a significant influence of educational projects on forming students' attitudes was assumed. While writing about the role and place of information technology in constructivistic model of education it is also pointed out that while applying them students learn behaviors and activities in the computerized environment, and thus searching and selecting information, building documents (also of network structure), database formation, visualization of results and creating computer graphic. In this case one can talk of the cognitive dimension of information technology applied in teaching. Every cognitive activity leads to a transformation of the inflowing information.

The research results are close to finding published four years ago in connection with the idea of educational paths and first attempts of modernizing teaching and learning genetics in polish schools

(Potyrala, 2004). Due to the importance of genetics in medicine, chemical industry, agriculture and as the innovative technology of the future, it was frequently the subject of articles in newspapers, magazines, as well as television reports. However, media presented the problems in a simplified manner, authors showed only some aspects of this field of knowledge. In view of a very diversified level of issued medial communications, frequently lack of knowledge and understanding basic biological terms was observed as well as using scientific notions without understanding them. There occur questions about the ways of deepening knowledge on scientific subjects regarding biology and latest achievements in this area on the basis of reliable sources of information, using information technology. These questions are still a challenge.

In the face of such state of thing we must take into consideration the development of new educational strategies in order to develop the need for the feeling of sense and deeper connection between knowledge and life.

Conclusion

Cultural value of medial communications is debatable. However, there is a consensus that they lead to integration of the society on the one hand, yet on the other they can deepen passivity and promote 'substitute reality experience'.

Presented views confirm the author's views that changes in the to-date ways of work and information technology tools use in biology teaching and learning are necessary. Necessity of these changes is the consequence of psychical needs of learners in the situation of universal access to information. The changes must regard the content, form and range of information together with individual experience of the information user.

The results of past and present survey research underlined disharmony between theoretical teachers' knowledge and skills and their practical applications. They leave an open answer to the questions: How to learn? Why and in what way should IT tools be applied in education? And in teacher training? Automation of various areas of knowledge proceeds. Creativity must save human dominance over the new technology tools. The notion of creativity may, however, also have a harmful dimension. Conviction regarding the possibilities of influence on the learning environment and the need for more thorough research on the processes affecting students, forms of their creative activity in this environment and the need for perfecting their metacognitive competence form the basis for the planned further cognitive and diagnostic research and analyses (exploration, classification and explication) as well as those that require decision making (postulation, optimization and realization) (Mazur, 1976).

Functions which are transmitted to the user for realization by the hypermedia and the way of their realization may devoid him of habits connected with then process of communicating with people or lead to violation of the balance in contacts with the surrounding reality.

Treating the medias as centres of collective activity the students are not prone to undertaking actual activities for example for environment. Fast progress of biology sciences broadens the area of lack of knowledge. Students they have consciousness, that knowledge which will win in track of studies soon will be out - of - date. It is in opposition with tasks of school in range of students' preparation to understanding of world and its changes as well as winning more and more better qualifications and expanding thought horizons (Potyrala & Walosik, 2008).

The data are interpreted in view of the new concepts of teaching and learning and point to the fact, that the critical thinking and creative attitude of people that could be the basic condition for their fulfillment in the multicultural contemporary world created by media.

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