

Medial Education within Biology Teaching in Junior High School and High School

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ABSTRACT *This paper describes the main assumptions regarding medial education and connections between medial and biological education at various stages of education. The educational paths are included in the new curriculum that is implemented in the Polish schools, but its realization requires a lot of new attempts to be undertaken by teachers. Creating students' medial competencies during biological education is one of European standards connected with preparing students for life in a society of knowledge.*

KEY WORDS: *educational medial paths, teaching contents, pedagogical solutions.*

Introduction

Authors of several Polish curricula and biology textbooks include, in many cases, content and purposes of different educational paths. At the junior high school level, these are education in philosophy, reading and media, health promotion, ecology, knowledge of the region, European education and Polish culture in comparison with the background of the Mediterranean civilization. At the high school level, these paths include reading and medial education, ecology, European education, philosophy, health promotion, and knowledge of the region.

Some of the authors of biology curricula do not include the specific contents related to the different educational paths and others do not even mention them. Yet, the contents of particular paths can be found in their programs in the form of elementary and post-elementary requirements to be fulfilled by students, or in the list of the intended student outcomes (e.g., ability to use various sources of information, selecting, and preparing arguments for a debate).

In the Resolution of the Ministry of Education of February 15, 1999 discussing the curriculum basis for general education, it is specified, among other things, that teachers of all content areas are responsible for the implementation of the educational paths that are targeted by the specification of student outcomes. Partial realization of these contents can be done during separate module classes lasting several teaching units, which will constitute a point of reference for students.

In accordance with the curriculum basis and assumptions of the educational reform, the main aim of medial education should be to prepare students for using all kinds of media, selection and critical evaluation of medial communication, as well as using the media as tools in intellectual work.

The main responsibility of the educational system in terms of medial education should be creating the conditions for acquiring information from various sources that will provide the students with the true image of the world of media and their influence on many areas of life, teach students to express their own evaluation and opinion, and review any medial communications, making it possible to design and implement medial messages on their own.

Medial Paths in Biology Curricula

While specifying the place of information technology (IT) in education, it is emphasized that the interdisciplinary and integrated nature of information technology leads to a situation where the implementation of the intended student outcomes related to IT should take place within various subjects.

In the curriculum of biological education, school responsibilities and selected students' outcomes connected with information technology use are explicitly stated. At the level of junior high school, gathering, integrating, developing and interpreting information, in many areas essential for explaining life processes, constitute some of the stated objectives. At the level of high school, tasks allowing students to use various sources of information for solving biological problems are also mentioned, while some basic student outcomes relate to the ability to use many sources of information for explaining biological phenomena and processes, as well as for formulating and justifying their own opinion.

A proposal of using computer tools at biology classes is connected with the concept of teaching and learning, assuming the restructuring of students' cognitive style and learning techniques adjusted to the new objectives and educational tasks. Computer technology and modern formulation of biological education aims force the teacher to change the strategy of teaching and methods of work at lessons – from the pass-over method (association) to problem solving and operation. Above all, the conditions and situations must be arranged, so that they enable students' independent acquisition of biological knowledge and actual, not apparent, activity of students involving their manipulative and intellectual activity.

Some authors of the biology curricula, which emphasize the need for interdisciplinary teaching and include reading and medial path to the biology teaching, enumerate, among others, the following aims of teaching:

- Developing an interest in the subject through the realization of difficult, yet interesting teaching material, using computer-aided methods.
- Ability to use various sources of biological knowledge, such as textbooks, computer software, scientific and popular scientific magazines or films.
- Ability to interpret information taken from various sources.

Exercises suggested by the authors of biology curricula, in connection with the objectives of reading and medial education, are, for instance, text analysis of selected documents that specify legal procedures and regulations for nature and environmental protection, and specify that, at the level of junior high school, analysis and interpretation of genetics achievements in medicine, animal and plant breeding on the basis of texts in popular scientific magazines, the Internet and others, are also important.

In the curriculum basis (Current Legislative Gazette of the Republic of Poland of June 19, 2001), there is an entry referring to general aims of school at the level

of specialist high school, where it is mentioned, among others, that in a specialist high school students should develop their skills of using the acquired knowledge, so as to better prepare for work in the modern world. Computer science education, information technology and communication are at present becoming one of the most important elements defining the basic competences of students.

Information technology integrates medial, informative and computer science education, but also all the educational subjects mentioned in the curriculum basis of general education.

In science and biology education, there appear, more and more frequently concepts of integrated teaching that exemplify to the students the world in a holistic manner. The principle of universal activity of students in cognitive, emotional and motivation, as well as in practical sphere is preferred.

Examples of Inter-subject Integration

A biology teacher has numerous possibilities of applying IT at lessons. This becomes really true especially when elements of IT are taken into consideration in the curriculum basis, curricula and assumptions of inter-subject educational medial path. In order to accomplish this, the teacher must adapt available computer tools for his or her needs, form biology teaching concept (or its particular parts), prepare the didactic structure in the form of conspectus or screenplays of lessons carried out on the basis of IT means and tools' use.

Looking for methods of realization of educational paths' content, Suchańska (2003) differentiates two kinds of inter-subject integration:

- a) content integration that emphasizes factual issues common for several subjects, and
- b) methodological integration that underlines mutual research methods characteristic of the integrated subjects and leads to forming the same skills (competences) for the students.

In Table 1, there are examples of both types of inter-subject integration in connection with the realization of medial educational path in:

1. multidisciplinary way (divergent model) or
2. interdisciplinary way (flow model).

In the first case, the topic is worked on independently, at several subjects, without time synchronization. In the second case, the realization of the topic by teachers of given subjects takes place simultaneously. The project method, for instance, creates such possibilities.

The competences connected with database formation, mentioned in Table 1, constitute the totality of activities supported by specific skills in order to manage information: evaluation and interpreting of medial communication, and then transferring and storing them in the form of given documents. Mutual exchange of these documents among students is possible due to electronic communication. The measure of its effectiveness is a new document, independently prepared by students, that constitutes a kind of evaluation register.

The realization of assumptions of medial educational path may also take place in the form of a linear model, when the teacher of one subject carries out a number of holistic lessons aiming at forming students' competencies in connection

Table 1
Inter-subject Integration in the Realization of the Topic Regarding Contemporary Environmental Issues
(Junior High Schools)

→ Divergent model — — → Flow model (increase of knowledge and skills)

Subject of the path	Subjects of teaching	Examples of contents	Research methods/ Students' competences
Media as the aid in acquiring knowledge on contemporary environmental issues	Biology	<ul style="list-style-type: none"> Reasons for and results of air pollution in Poland and in the world in medial messages. 	<ul style="list-style-type: none"> Use of multimedial tools in searching information on the condition of natural environment.
	Geography	<ul style="list-style-type: none"> Worldwide contemporary environmental problems in available sources of information. Computer tools enabling data analysis regarding the atmosphere structure and degree of contamination of biosphere. Demographic explosion in developing countries in the media. 	<ul style="list-style-type: none"> Analysis and evaluation of degree of biosphere contamination on the basis of various sources of knowledge. Analysis of publications devoted to selected problems of biosphere contamination and protection, copying and forming data base, use of ready materials, taking notes. Independent making medial messages. Use of electronic communications in order to exchange information.
	Information Technology	<ul style="list-style-type: none"> The Internet as a communication tool. Internet as a source of knowledge on contemporary environmental issues. Knowledge of proper Internet domains and possibility of their application in the process of acquiring knowledge of contemporary environmental issues. 	<ul style="list-style-type: none"> Evaluation and presentation of results on the basis of computer tools.
	Chemistry	<ul style="list-style-type: none"> IT tools and means helpful in acquiring knowledge on: <ul style="list-style-type: none"> ➤ acid rains ➤ greenhouse effect ➤ air components, disappearance of atmospheric ozone 	
SUMMING UP OF THE PATH'S SUBJECT			

with the aims of the given educational path. The latter model connected with the realization of educational path has both advantages and disadvantages. Sometimes, it means an additional class for students and teachers alike. The model often functions as a separate subject (most frequently it is 'ecological path'). The considered issues are then treated by the students as a separate whole. There is also a possibility (or rather a danger) of extending by the teacher those contents in which he or she specializes; for instance, a biologist emphasizes biological issues, a geographer underlines geographical problems, etc.

In the case of medial education, a computer scientist would be bound to stress the matters regarding use of multimedia computer applications and its peripheral equipment, as well as using the basic terminology connected with IT, and a Polish teacher would emphasize press publications, the role of library in gathering and making the sources of knowledge available, basic kinds of linguistic expression, etc.

A biology teacher at his/her lessons can include the content of particular educational paths according to the linear model (Tables 2 and 3), according to the entry in the curriculum basis and teaching aims contained in the curriculum selected by him or her.

Table 2

Example of Linear Model of Medial Educational Path in Biology Lessons in Junior High School According to Sawicka, 2000 (the Arrangement of Entries Has Been Modified)

Curriculum entry (Subject of the path)	Lesson No.1	Lesson No. 2	Lesson No. 3	Lesson No....	Expected students' competences
Media as an aid in acquiring knowledge /the Internet as a source of knowledge on contemporary environmental issues	Searching and collecting data on biosphere threats, importance of protection of bio-variety and legal regulations regarding protection of nature and natural environment. Studying the library resources via the Internet	Ordering information (alphabetic and topic catalogue) regarding contemporary environmental problems. Educational multimedia programs.	Designing ways of solving worldwide environmental problems. Use of computer tools in integration of knowledge		Ability to search and collect data.
					Ability to evaluate the available medial communications.
					Ability to use the collected information
					Ability to use multimedia encyclopedias
Interpersonal information /Verbal and non-verbal communicational acts, signs and images	Mass media and their role in biological education	Role of medial messages in forming the attitude of responsibility for the condition of the natural environment.	Exchange of information via electronic communication. Critical reception of various types of communications.		Ability to use various means of communication.
					Ability to point to positive and negative aspects of mass communication. Ability to present the most important features of medial messages.

Table 3
Example of Linear Model of Realizing Medial Educational Path in Biology Lessons in High School (Curriculum Entries and Educational Aims according to Nowak, 2002)

Curriculum subject/ Educational aims regarding medial education	Lesson No. 1	Lesson No. 2	Lesson No. 3	Lesson No. ...	Expected students' competences
Sender and recipient in audiovisual message/Teaching about the role of various stimuli in perceiving reality	Excitability as a reaction to various kinds of stimuli. Verbal and non-verbal information transfer	Various carriers of information. Examples of biological simulation contents e.g., scientific films, computer programs.	Functions of medial communications. Evaluation of the influence of new way of acquiring and extending biological knowledge on the recipient.	Use of computer tools in integration of knowledge regarding the influence of various stimuli on human health	Ability to gather information on the latest technological achievement in the area of reality simulation. Ability to characterize the basic features of audiovisual culture and its influence on man

The Main Aim of Introducing Particular Educational Paths into the General Education Curriculum

More and more often attention is paid to the fact that the contemporary problem is not so much lack of information as its surplus, and the mass of information as well as its unnecessary excess of details may be an effective tool of misinformation. Hence, forming in students skills, such as selection, evaluation and organization of information (forming its structure) seems justified, so that they can reach appropriate conclusions. A student, not prepared for such information reception, gets lost in the information flow, and computer education as such may not play the most important educational function, as it frequently happens nowadays, but must be connected with the whole system of education, in order to create a new quality of not frustrated and not socially alienated people in the information era (Siemieniecki, 2000).

The main aim of introducing the issues of particular educational paths into the general education curriculum was extending particular areas of knowledge (subjects of teaching) by current topics requiring thinking in interdisciplinary ways.

Taking the interdisciplinary approach to knowledge and using problem teaching is a European educational model that was reflected in the Resolution of Minister of Education on standards of requirements being the basis for carrying out tests and examinations. (Current Legislative Gazette No. 92, item 1020).

According to Cichy (2003), the analysis of curriculum issues in the Polish former and current schooling system allows stating that the new system of biological

education introduced positive structural and content changes. It brings the acquired knowledge closer to the problems of contemporary world and influences the formation of a personality open for reacting to the changes taking place in the environment.

An open problem that still remains relates to the organization of the didactic process. It can be assumed that standards of school facilities will guarantee carrying out the didactic process, meeting the requirements resulting both from the curriculum basis and educational standards.

Bogaj et al. (2000), referring to the opinion of the authors of a report entitled Education for Europe, claim that contemporary media, especially information techniques, lead to: 1) transfer from objective to construed knowledge; 2) transforming educational mission of teaching into the mission of equipping students with methods of individual learning; 3) increasing, and in future maybe prevailing, role of the process of communicating and gaining knowledge with the help of technology; 4) transfer from industrial society to learning society. The process of integrating information technology and particular subjects of teaching (including biology) means integration regarding curricula, didactic aids, strategies and computer-aided methods of teaching.

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