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**VASILY KACHURKO, ULADZIMIR ZUYEU**  
*Baranovich State University, Republic of Belarus*  
*E-mail: wald\_k@rambler.ru*

## **POTENTIALITIES OF USING INTERNET RESOURCES IN ACADEMIC WORK (NATURAL SCIENCE DISCIPLINES)**

### **Abstract**

The article deals with the opportunities and problems of using Internet-resources in the process of teaching natural-science disciplines. There are some psychological and pedagogical problems in the process of education with the use of Internet, which are to be solved within the bounds of the university through the raising the level of instructors and lecturers' skills, experience exchange of innovation techniques of particular instructors and lecturers.

Within the limits of the research have been studied the experience of using Internet resources by the instructors and lecturers of the chair of natural-science and mathematical disciplines of Baranovich State University and the students of the first and second year with the specialization "Primary Education. Belarusian Language and Literature" and "Primary Education. Physical Training" who study natural science disciplines like physical geography, study of local lore, ecology, biology and radiation safety. It's possible to talk about the insufficient actual use of the Internet resources in the process of studying by the students, and partial use of them by the instructors and lecturers.

We have conducted a research of Internet sphere for the purpose of exposure of sites which contain subject-oriented information that can be applied to the natural-science disciplines. There are definite sites containing information that corresponds to the program of natural-science disciplines and that can be used by students and instructors and lecturers.

Using Internet resources in teaching natural science disciplines will allow satiating the process of teaching with information and providing the contents of the education with relevant information.

**Key words:** Internet-resources, the process of studying, natural science disciplines

### **Introduction**

Today the higher school has begun its transition to organizing academic work in the setting of unlimited access to information. In modern society the student has changed and his aspiration to obtain learning information not only through the traditional sources – from the teacher or the book – but also using the potentialities of information technologies has become natural. To address students' needs in acquiring knowledge, the teacher should also change. In other words, he should become proficient in educational information technologies and, considering their fast development, he should continually improve his information standards by means of self-education. The Internet medium couldn't but affect education both in terms of its content and objectives as well as in terms of making the most of the technological possibilities, which have opened up, to attain these objectives.

This research studies potentialities and problems of using the Internet resources in teaching natural science disciplines.

Development of information and telecommunication technologies have created base which allows to develop the innovative training technologies connected with use of information educational resources in educational process. Use of these resources forms a problem connected with development of methodology of adaptation of information resources in real educational process on the basis of application the Internet-technologies.

The decision of this problem assumes, in our opinion, allocation of the following primary goals: classification of information educational resources; formation of principles and approaches of use of information educational resources on the basis of the Internet-technologies in educational process; development of the mechanism of the coordination operated the Internet-resources with traditional forms of methodical materials.

Use the Internet-resources is a part of innovative pedagogical technologies which alongside with traditional technologies provide educational process.

Advantages of use of the Internet by preparation for employment are obvious to any teacher having access to «Global Network». The Internet – an irreplaceable source for actualization of materials of textbooks, search of the additional information, the tool allowing considerably to save time and means by development of teaching materials to employment. However, the unlimited volume of the information is far not everything, that can give a new information field to teachers and students.

The new information and communication technologies make the integration of study disciplines practi-

cable and allow to find points of contact between general and specialist disciplines thus implementing the idea of interdisciplinary ties. Thereby, education brings into focus the student’s methodological training not only in a separate discipline but as an integrated whole based on the use of information and communication technologies (Мизин, Колин, 1996).

The idea that methodological training of teachers is necessary and should be based on the skills acquired in using ICT is not new in itself. Moreover, a lot of the existing methodological resources can be made use of to this effect (Уваров, 1999).

Research shows that one of the major users of information technology in academic work is a school teacher. Many higher school teachers are not yet proficient in new information and communication technologies and this problem is well understood and is getting great attention (Панкратова, 2001; Уваров, 2002). What is much less understood is the problem of developing in teachers a set of professional skills which they need to make teaching effective in a new environment. Now that information is in abundance, teaching and learning as well as developing skills of independent study and ‘extraction’ of knowledge call for a considerable enrichment of the traditional pedagogical package. Among the new potentialities, there are those based on the use of the Internet.

A. Андреев (2002) points out such psychological and pedagogical problems of the Internet-based academic work as:

- the absence of theory of learning within modern information-educational media and, as its component, the absence of its conceptual and categorical apparatus;
- the necessity for having an optimized psychological and ergonomical view of Internet resources as study (information) materials and human perception of the Internet materials;
- unreadiness of teachers and students to join in up-to-date information-educational medium;

We single out two main spheres of Internet resources usage in the teaching process of natural science disciplines.

Firstly, it is the direct use of Internet in the teaching process, mostly during practical classes.

Secondly, it is the use of Internet resources for the organization of independent out-of-class student work.

We studied the experience of Internet resources usage by the teachers of the chair of natural science and mathematical disciplines of Baranovich State University (all in all 14 people), and first- and second-year students with the specialization “Primary Education. Belarusian Language and Literature” and “Primary Education. Physical Training” who study natural science disciplines like physical geography, study of local lore, ecology, biology and radiation safety (all in all 107 people).

The average length of service of the interviewed teachers is 14.57 years. Moreover we singled out 3 age groups according to their length of service: 1) under 10 years (4 people); 2) 11–20 years (6 people); 3) 21 and more years (4 people). In terms of gender, there were 10 female and 4 male among them.

The respondent students were from 17 to 20 years old including 58 female and 49 male.

The respondent teachers valued the degree of computer skills from 3 to 10 (10 points were used by the respondents who consider themselves both users and computer programs administrators), the average coming to 6.93. The first group respondents got 8.75 users points due to the active introduction of information technologies into the university educational process for the previous 10 years.

The respondent students valued the degree of computer skills at 7.89 points.

The frequency of Internet-resources usage for the sake of information base by the teachers and students is shown in Table 1.

**Table 1.** The frequency of Internet resources usage while preparing for the classes (in % in comparison with the number of people interviewed) (%)

	Teachers	Students
Constantly	28.57	25.23
Episodically	42.86	63.55
Very seldom	28.57	3.85
Never	0	7.7

The teachers with the length of service less than 11 years are the only ones to use information resources of Internet very seldom.

The resources used by the respondents are classified in the following table.

**Table 2.** The Internet resources used by the respondents (according to the rating, in % of the number of respondents) (%)

Teachers		Students	
1. Edition sites (newspapers, magazines)	71.42	1. Essay and other student papers site	78.5
2-3. College sites	64.29	2. 1. Edition sites (newspapers, magazines)	26.17
2-3. E-mail	64.29	3. Internet versions of scientific magazines	25.23
4. Internet versions of scientific magazines	57.11	4. E-mail	15.4
5. Data base of normative documents	42.86	5. State structures sites	12.15
6-7. Research institutes sites	28.57	6. Higher education institutions sites	9.34
6-7. State structures sites	28.57	7. Research institutes sites	4.67
Essay and other student papers site	0	8. Others (Internet games)	3.85
		9. Data base of normative documents	0%

Thus, the majority of the teachers-respondents actively use the Internet for preparation and e-mail for communication. Data base of normative documents is less actively used which can be explained, from our point of view, by peculiarities of the taught disciplines. Only a fourth part of the questioned teachers use materials of research institutes web-sites and state structures, though we assume that department web-sites (for example, web-sites of natural resources and environment protection department, agriculture and foodstuffs department, emergency situations department, healthcare department, web-sites of regional and town executives committees) contain a lot of factual information, which can be widely used in the process of education. It should be mentioned that teachers do not use synopsis websites or websites of other student works.

Students-respondents have shown quite different results. The majority of the questioned students actively use synopsis web-sites; in such a way they “save” their extracurricular time without paying attention to the actuality of the material, the possibility of its usage in a particular situation of the education process, and also to the necessity of observing intellectual property rights.

Only a quarter of the questioned students uses edition web-sites (websites of newspapers, magazines, periodicals, journals), the majority of them are second-year students.

It is important to observe intellectual property rights while using Internet resources. 78.57% of the questioned teachers indicate authorship, which is achieved, from our point of view, by unified requirements to publications and references to sources of information. Only one teacher (who belongs to the 2<sup>nd</sup> age group according to seniority) indicated non-observance intellectual property rights and two teachers (from the 1<sup>st</sup> and the 2<sup>nd</sup> age groups) admitted occasional observance referring to free access to information in the Internet.

The students have shown quite the opposite results. 74.77% do not indicate authorship of the used materials; 13.08% always indicate it and 12.15% indicate it sometimes. This situation, as we see it, can be improved by a more strict approach to students' written papers.

57.14% of teachers do not know websites which can be useful for students while preparing for natural sciences. If one compares these data with the results of Internet resources usage (Table 2), one can see the underestimation of opportunities of these resources by teachers. Internet addresses are indicated in syllabus only by one teacher; only 5 teachers inform students about websites before the lecture.

This information is proved by students' questioning. 81% of the respondents do not know website addresses which can be used in preparation, and 19% indicate only several http-addresses.

To crown it all, one can speak about insufficient usage of Internet resources by students, and partial usage by teachers.

We carried out the analysis of the Internet medium in order to discover the sites that include the information (Table 3) directed to natural science disciplines. The research has been made according to key words in the GOOGLE Search system.

**Table 3.** Examples of the Internet resources with subjects-orientated content

Kinds of sites	Natural-science disciplines			
	<i>Biology (incl. Botany and Zoology)</i>	<i>Ecology</i>	<i>Study of Earth and local study of local lore</i>	<i>Radiation security</i>
The state and international structures	<a href="http://www.iucn.org">http://www.iucn.org</a> (International Union for conservation of Nature) <a href="http://www.redlist.org">http://www.redlist.org</a> (International Red Book) <a href="http://www.nature.ok.ru">http://www.nature.ok.ru</a> (Rare and disappearing animals)	<a href="http://www.minpriroda.by">http://www.minpriroda.by</a> (The Ministry of natural resources and conservations of the environment of Belarus) <a href="http://www.wwf.ru">http://www.wwf.ru</a> (WorldWildFound)	<a href="http://www.belstat.gov.by">http://www.belstat.gov.by</a> (The Ministry of statistic of Belarus) <a href="http://www.brest-region.by">http://www.brest-region.by</a> (Brest executive committee) <a href="http://www.baranovichy.by">http://www.baranovichy.by</a> (information portal of Baranovichy City)	<a href="http://rescue01.gov.by">http://rescue01.gov.by</a> (The Ministry of Emergency Measures of Belarus) <a href="http://www.gosnadzor.ru">http://www.gosnadzor.ru</a> (Service on ecological, technological and nuclear supervision)
Editions (newspapers, magazines, other publications)	<a href="http://www.vokrugsveta.ru">http://www.vokrugsveta.ru</a> (Magazine «Around of the World») <a href="http://nature.ok.ru/invertebrates/">http://nature.ok.ru/invertebrates/</a> (Magazine «Zoology of invetebrate»)	<a href="http://www.izvestia.ru/science">http://www.izvestia.ru/science</a> (Section “Science” of the newspaper “Izvestia” (Russia)) <a href="http://www.ecoethics.ru">http://www.ecoethics.ru</a> (publication of Kiev ecology-cultural Centre)	<a href="http://www.vokrugsveta.ru">http://www.vokrugsveta.ru</a> (Magazine «Around of the World»)	<a href="http://geografer.ru">http://geografer.ru</a> (The manual «The Nature and the reasons of earthquakes and a tsunami») <a href="http://cbsafety.ru">http://cbsafety.ru</a> (Magazine «Chemistry and biological security»)
University	<a href="http://portal.grsu.by">http://portal.grsu.by</a> (Faculty of biology and ecology of Grodno State University) <a href="http://mchs.bp.by">http://mchs.bp.by</a> (Gomel engineering institute) <a href="http://tuvsu.ru">http://tuvsu.ru</a> (Educational complexes) <a href="http://uspi.ussuriisk.ru/study/geofak">http://uspi.ussuriisk.ru/study/geofak</a> (Faculty of geographic of Ussuri University)			
Internet-magazin and newspapers	<a href="http://www.geocities.com/berkut_ua/berkut.htm">http://www.geocities.com/berkut_ua/berkut.htm</a> (Ornithological magazin “Berkut”)	<a href="http://www.ecoindustry.ru">http://www.ecoindustry.ru</a> (magazine «Ecology of work») <a href="http://www.seu.ru/members/ucs/chemwar">http://www.seu.ru/members/ucs/chemwar</a> (Newspaper «Ecology and Human Right») <a href="http://www.seu.ru/members/ucs/chemwar">http://www.seu.ru/members/ucs/chemwar</a> (newspaper «Problems of chemistry security»)	<a href="http://www.geo.ru">http://www.geo.ru</a> (magazin «Geo») <a href="http://www.national-geographic.ru">http://www.national-geographic.ru</a> (magazin „National Geographic“)	<a href="http://www.promatom.ru">http://www.promatom.ru</a> (magazin «Promatombezopasnost») <a href="http://www.e-m.ru">http://www.e-m.ru</a> (magazine «Energymarket») <a href="http://www.radioecology.ru">http://www.radioecology.ru</a> (magazin «Security of environmental»)
Date base	<a href="http://www.redbookbel.net">http://www.redbookbel.net</a> (Red Book of Belarus) <a href="http://www.wcmc.org.uk/data/database/rl_anml_combo.html">http://www.wcmc.org.uk/data/database/rl_anml_combo.html</a> (Red Book of IUCN. Search by taxonomie, state, status) <a href="http://ecoclub.cross-edu.ru/perv.htm">http://ecoclub.cross-edu.ru/perv.htm</a> (Determinant-book of plants, lichens) <a href="http://hbc.bas-net.by/plantae/">http://hbc.bas-net.by/plantae/</a> (Biodiversity of plants in Belarus) <a href="http://www.sudarrb.com/page_Belarus/animals.html">http://www.sudarrb.com/page_Belarus/animals.html</a> (Animals of Belarus) <a href="http://www.biodat.ru">http://www.biodat.ru</a> (Base date of reservat)	<a href="http://ncpi.gov.by">http://ncpi.gov.by</a> (Законодательство Республики Беларусь) <a href="http://www.ramsar.org">http://www.ramsar.org</a> (Ramsar Convention of water and peatlands...)	<a href="http://maps.google.com">http://maps.google.com</a> (Pictures of a surface of the Earth from space) <a href="http://globus.tut.by">http://globus.tut.by</a> (Date bank of Monuments of history) <a href="http://www.radzima.org">http://www.radzima.org</a>	<a href="http://ncpi.gov.by">http://ncpi.gov.by</a> (The legislation of Belarus) <a href="http://www.pravo.by">http://www.pravo.by</a> (Date bank of law information in Belarus)
Research institutes	<a href="http://biodiversity.ru">http://biodiversity.ru</a> (Centre of wild nature conservation) <a href="http://gardens.narod.ru">http://gardens.narod.ru</a> (Gardens of Far Eastern Department of RAS) <a href="http://www.zin.ru">http://www.zin.ru</a> (Institut of Zoology)	<a href="http://www.pan-germany.org/info/osteuropa.htm">http://www.pan-germany.org/info/osteuropa.htm</a> (International Codex of pesticides) <a href="http://www.recyclers.ru">http://www.recyclers.ru</a> (Problems of recyclers)		<a href="http://www.secnr.su">http://www.secnr.su</a> (Science Centre for atomic and radiation security)
Other	<a href="http://www.prushki.org">http://www.prushki.org</a> (NGO “BirdLife Belarus”)	<a href="http://www.svitiaz1.narod.ru">http://www.svitiaz1.narod.ru</a> (Report of research in reserve «Sviatiaz» in 2000-2001) <a href="http://www.waste.com.ua/cooperation">http://www.waste.com.ua/cooperation</a> (project «Cooperation for decision of waste problems») <a href="http://www.ecodefence.ru">http://www.ecodefence.ru</a> (NGO «Ecodefense!») <a href="http://www.tolcom.ru/kiril/Rozenberg/Ea0.htm">http://www.tolcom.ru/kiril/Rozenberg/Ea0.htm</a> (Book «Ecology in quotation and aphorism») <a href="http://www.aseko.org">www.aseko.org</a> (Association of ecological education) <a href="http://www.amritech.ru">www.amritech.ru</a> (Technology of water cleaning)	<a href="http://peatlands.by">http://peatlands.by</a> (project «Restoration and steady management of peat bogs of Belarus») <a href="http://www.nemanenvironment.org">http://www.nemanenvironment.org</a> (The project on protection of river basin of Neman)	

Thus there are a sufficient number of sites in the Internet medium containing the information that meets the disciplines programs requirements.

In order to use the informational Internet resources effectively in the educational process, it's not enough for a teacher to be a master of information technologies. He has to manage proper pedagogical technologies and techniques, to understand the place and the role of Internet resources in the educational process. Unfortunately, it hasn't been paid due attention to in the professional teacher training process. The address to personal teacher experience of innovation work and the analysis of his university practical work is required.

Within the first stages of his work it's necessary to find out an exhaustive list of those specific techniques and practices that a teacher of a higher institution of learning needs for his professional work in terms of an open access, informational and methodical surplus.

It's important to organize the system of permanent informational culture teacher perfection.

Within the university it's necessary to organize students' self-education in the modern Internet medium aiming at opening qualitative characteristics of learning, thus guaranteeing the achievement of high level skills and attainments. It's important to show a student how to orientate himself in the Internet communication flow, how to find the parts of information which are needed for his work. This may be achieved during information science studies. Everything mentioned is possible to perform with the help of a personal-directed approach that provides the conditions for personal self-realization.

The use of Internet resources in natural science disciplines teaching will allow to satisfy the educational process with actual information.

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