STUDENT VISIONS ON THE INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING AND LEARNING BIOLOGICAL SCIENCES

VIZIUNEA STUDENŢILOR DESPRE INTEGRAREA TEHNOLOGIEI INFORMAŢIEI ŞI COMUNICAŢIILOR ÎN PREDAREA ŞI ÎNVĂŢAREA ŞTIINŢELOR BIOLOGICE

PETRUŢA Gabriela-Paula
University of Piteşti, Romania

Abstract. *Modernization of the education system involves primarily the change and improvement of education tools used within the activity of teaching-learning and school children's evaluation. In this respect, at present, the computerized informational system has an essential role as didactic tool, and as a source of documentation and access to the information as well, both for the teachers and school children. Through computer mediation, the biology teacher can use a various range of educational software for teaching this discipline, with different contents and functions. Besides these types of educational software, the biology teacher can also use CDs with various topics, including encyclopedia of plant or animal world, as well as atlases of human anatomy, either purchased or realized by themselves. In this paper we discuss the student's point of view concerning the use of Information and Communication Technologies at various moments of the lesson and during the entire lesson.*

Key words: computer, Information and Communication Technologies, biological science, student, lesson.

Rezumat. *Modernizarea învăţământului impune în primul rând schimbarea şi perfecţionarea metodelor şi mijloacelor de învăţământ folosite în activitatea de predare-învăţare şi evaluare a elevilor. În acest sens, în prezent, sistemul informaţional computerizat are un rol esenţial în optimizarea activităţii şcolare ca mijloc didactic, precum şi ca sursă de documentare şi acces la informaţie, atât pentru cadrele didactice cât şi pentru elevi. Prin intermediul calculatorului, profesorul de biologie poate utiliza o gamă variată de softuri educaţionale, cu conţinuturi şi funcţii diferite în cadrul predării acestei discipline. Pe lângă aceste tipuri de softuri educaţionale, profesorul de biologie mai poate folosi CD-uri cu diverse tematici, inclusiv enciclopedii ale lumii plantelor şi animale, precum şi atlase de anatomia omului, cumpărate sau realizate personal. În articol se va prezenta punctul de vedere al studenţilor referitor la utilizarea Tehnologiei informaţiei şi comunicaţiilor în diferite momente ale lecţiei şi pe întreaga durată a acesteia.*

Cuvinte cheie: computer, Tehnologia informaţiei şi comunicaţiilor, ştiinţe biologice, student, lecţie

INTRODUCTION

At present, it is recognized the fact that ICT can be used in various contexts and in numerous modalities for supporting the teaching and learning activities (Woollard, J., 2007).

In the didactical activity, the personal computer or its portable variant, named laptop, is a modern didactic tool which can perform the teaching activity carried out usually by the teacher, when an educational soft is used. Moreover, is an didactical tool which can be used by the teacher for writing of documents, creating data banks, graphical representation of data, PowerPoint presentations, by using of some multimedia facilities, or as a tool of teaching within the lessons, in which case the computer is used for projecting some materials in order to transmit new knowledge, or to systematize the knowledge.

ICT (Information and Communication Technologies) are defined as "a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" (Blurton, C., 1999, p.1). The contemporary technologies used in education includes "learning aided by computer, Internet, visual classes and digital colaboration by all the electronic tools of information. The techniques and tools can be applied by CD-ROM, DVD, video, television and computers, communication by satellite, digital networks (by cable and radio), in other words a range of various information tools and software. Both offline technologies (tutorials, CD-ROMs, video, transmisions) and online technologies (Internet, e-mail, audio and video conferences, etc.) can be used (Adăscăliţei, A., 2007, p. 156).

In our country, the endowment of schools with computers, laptops, video projectors, television sets, establishment of informatics rooms and installation of AeL platform, created favourable conditions for using computers and information technologies within the activities carried out with pupils.

Taking into consideration modernization of education, the practicant students are encouraged to use within the lessons both a diverse methodological register, and an assembly of various didactical methods, in order to assure the success in teaching the pupils. As future teachers, who must know "how, where and when to use the technologies (and also when should not use) for class activities and presentations, [...] for obtaining supplementary information related to the content of their subject and pedagogical knowledge which can support their professional development", the practicant students are stimulated to use some technologies, various tools and contents in digital format within the didactical activities carried out during the pedagogical practice. In this way is aiming at the development of their "technological alphabetization" (UNESCO, 2008, p. 8).

In order to optimize the projection and realization of some didactic activities by the practicant students during the pedagogical practice they are carrying out in gymnasium, we investigated the student's opinion concerning the use of ICT in teaching-learning of biology.

The objectives of our research were the following:

1. investigating the use of ICT in the projection of lessons by the practicant students.
2. finding the mode of using computer within the lessons;
3. evaluating the level of student's interest for using ICT within the lessons.

MATERIAL AND METHOD

In order to find the point of view of students from the Faculty of Science of the University of Pitesti, concerning the use of computer and integration of ICT in teaching-learning biological sciences, an empirical research was done, based on the questionnaire method. The questionnaire was filled in by students at the end of first semester, after the pedagogical practice, during which each of them was teaching two lessons. The questionnaire contained questions concerning information sources for projecting the lessons, didactical tools used within the lesson, moments of the lesson in which computer was used, didactical methods associated with the content of materials realized and presented by using the computer, interest and pro and against arguments concerning the use of ICT within the lessons.

The starting hypothesis was the following: the use of technologies in teaching-learning of biological sciences is conditioned by the number of hours dedicated to the study of a certain discipline per week, theme of the lessons which must be teached, number of pupils in the class, age and individual particularities of the pupils in the class, and also the interest of students for their integration within the lesson.

The sample used in the research comprised 54 students from the Faculty of Science of the University of Pitesti, in the 3-rd year of study, from the academic year 2009 - 2010, out of which: 17 students in Biology (who have been teaching notions of zoology and ecology), 24 students in Ecology and environment protection (who have been teaching notions of botany and ecology), 7 students in Horticulture (who have been teaching notions of botany), and 6 students in Nursing (who have been teaching notions of human anatomy and physiology).

RESULTS AND DISCUSSIONS

In projecting the lessons, all the practicant students have used the biology manual as primary documentation source. For supplementary information they used the following sources: specialty books (18.51% from the students), specialty atlases (14.81% from the students), information from the Internet sites (70.37% from the students), photographs taken from the Internet (81.48 % from the students) and AeL collection of biology lessons (9.25 % from the students).

Within the lessons they have been teaching, the students have used a large diversity of didactic tools (table 1), taking into consideration the importance of their use in understanding and acquiring of scientific concepts by the pupils.

The data presented in table 1 shows that 37.03% from the students have used during the lessons information stored on electronic support (CD or memory stick) and that 5.55% from them have used the interactive lessons offered by the AeL software. The presentations realized in PowerPoint by the practicant students, comprising texts and/or photographs, have been used for the formation to the pupils of the scientific concepts specific to all the biological sciences studied as disciplines in gymnasium. The AeL interactive lessons have been used only for transmitting knowledge of human anatomy and physiology.

Other aspects considered by application of the questionnaire reffered to moments of the lesson in which the students have used the computer and didactical methods associated to the content of realized and presented materials.

Table 1

Didactical tools used by the students within the lessons

Didactical tools	Biological discipline teached	Students (%)
Plant collections	Botany, Ecology	12,96
Collections of preserved animals	Zoology, Ecology	9,25
Microscopy slides	Botany, Human anatomy and physiology	3,70
Mouldings	Botany, Zoology, Human anatomy and physiology	18,51
Sketches	Botany, Zoology, Human anatomy and physiology, Ecology	64,81
Transparencies, by using the overhead projector	Botany, Zoology	12,96
Photographs printed from the Internet	Botany, Zoology, Human anatomy and physiology, Ecology	46,29
CD, by using the computer/laptop and video projector	Zoology, Ecology	12,96
Memory stick, by using the computer and video projector	Botany, Zoology, Human anatomy and physiology, Ecology	24,07
AeL software, by using the computer	Human anatomy and physiology	5,55

We found that the computer was used in lessons for communication new information, for oral verification of the knowledges acquired by the pupils from previous lesson by 9.25% from the students. A slightly higher percentage of the students (12.96%) have used computer and their own materials for psychological preparation of pupils for receiving of the new contents, while about a third of the practicant students (33.33%) used them for communicating/acquiring new contents, and 18.51% for fixation of the knowledge. In the case of recapitulation and systematization lessons, 3.70% from the students have used own information stored in electronic form for the systematization of the pupil's knowledge within the two lessons of recapitulation which they have realized. In the case of AeL based interactive lessons, the computer and didactical tools were used for transmitting new knowledge by 5.55% from the students, the pupils being tested and evaluated after each of the informational content presented.

Analysing these data, it is obvious the fact that the majority of practicant students who have choosen to use the computer within the lesson, used their own materials for communicating/acquiring new contents (33.33%). Only 9.25% from the practicant students carried out oral verification of the knowledge acquired by the pupils within the previous lesson.

Concerning the didactical methods which the students have associated to the content of presentations made using the computer and Internet, and presented by using the either the computer/laptop and the video projector in various types of lessons or in different moments of the lessons, as shown in table 2, we found that a diversity of didactical methods have been used. Moreover, the practicant students proved originality in creating their own presentations for lessons and also

in applying certain methods of teaching. In the case of AeL interactive lessons, the practicant students have used conversation, and sometimes explanation.

Table 2

Association of didactical methods with the content of materials realized and presented by students within the lessons

The lesson's stage in which computer was used	Didactical methods	Students (%)
Lesson for communication/acquiring new knowledge		
verification of knowledge	conversation	9.25
psychological preparation of the pupils for receiving new contents	conversation	9.25
	problematizarea	3.70
communication/acquiring new contents	explanation, demonstration, observation, conversation	18,51
	observation, conversation, learning by discovery, explanation	9.25
	observation, conversation, problematization, explanation	3.70
	virtual experiment, observation, conversation, explanation	1.85
knowledge fixation	conversation	18.51
Recapitulation and systematization lesson		
recapitulation of the content based on an established plan	conversation, explanation	3.70

Concerning the interest of students in using ICT within the lessons, 61.11% of them prefer to use the computer as support for teaching based on their own materials, 18.51% prefer to use the AeL interactive lessons, while 20.37% did not want to use the computer and ICT within the lessons.

From the questioned students, 61.11% considered that it is easier to use the computer as support for teaching, using their own materials, than using AeL lessons, the reason being that in the case when only one hour is allocated to that discipline is difficult for the other students who are following them to practise teaching, to return to notions which proves to be not enough understood by the pupils. As an disadvantage of the use of computer was mentioned the fact that the repeated application of the same scenario of the lesson lead to boring and monotony. Therefore, some contents are better understand by the pupils if some other didactical methods and tools are used.

Among the advantages of using AeL lessons, the practicant students mentioned presentation of some virtual experiments and simulation of some human physiological processes, which otherwise can not be observed. As disadvantages of using AeL lessons, the students have mentioned the following: prolonged activity with the computer is affecting the sight of pupils; too many pupils are working with a single computer, and if one of them is finishing earlier an instruction sequence, he is disturbing the rest of pupils; the pupils have not enough space to take notices; some tests can be correctly solved by the pupils even by moving the mouse at random, without knowing the informational content.

CONCLUSIONS

The students are considering that:

1. ICT can be used:

- in projecting the lessons:
  - for supplementary documentation;
  - for preparing PowerPoint presentations.
- in teaching-learning biological sciences:
  - for presenting their own materials carried out in PowerPoint, by using the videoprojector in the laboratory of biology or in the classroom; in this case, the students can use a diversified methodology for presenting original materials;
  - by using AeL interactive lessons, in the laboratory of informatics.

2. is easier to use the computer as a support for teaching, than AeL lessons; at the end of first pedagogical practice, the percentage of students interested in the use of computer within the lessons increased

3. the use of ICT within the lessons during the first pedagogical practice has:

- advantages, such as: the presentation of some virtual experiments and simulation of some human physiological processes;
- disadvantages, such as: the case when only one hour is allocated to that discipline; affecting the sight of pupils; too many pupils are working with a single computer; the pupils have not enough space to take notices; some tests can be correctly solved by the pupils even by moving the mouse at random, without knowing the informational content.

In order to optimize projection and realization of the lessons would be recommended for the practicant students to study additionally the biology lessons from the INTUITEXT colection and the cooperation among the students who are using ICT in teaching and the other students, who are avoiding to use their own material for presenting informational content of the lesson although they are able to create it.

REFERENCES

1. **Adăscăliţei A., 2007** – *Instruire asistată de calculator.* Bucureşti. Ed. Polirom. p.156.
2. **Bontaş I., 2001** – *Pedagogie*. Tratat. Bucureşti. Ed. BIC ALL, p. 287.
3. **Blurton C., 1999** – *New Directions of ICT – Use în Education.* 51 pp. http://www.unesco.org/education/educprog/lwf/dl/edict.pdf
4. **Woollard J., 2007** - *Learning and teaching using ICT in secondary schools*, Exeter, UK, Learning Matters Ltd, 192pp. (Achieving QTS). http://eprints.soton.ac.uk/46327/
5. *****UNESCO, 2008** - *Standarde de competenţă pentru cadrele didactice în domeniul tehnologiilor informaţiei şi comunicării* (SCCD-TIC) http://www.elearning.ro/resurse/UNESCO_TIC_StandardeProfesori2008.pdf