

MILAN KUBIATKO

Comenius University, Bratislava, Slovakia

E-mail mkubiatko@centrum.sk

HOW DO TEACHERS USE INFORMATION AND COMMUNICATION TECHNOLOGY IN BIOLOGY TEACHING?

Introduction

Nowadays, education undergoes the great progress. The end of time, when the overhead projector with slides was the latest equipment found at school, has been reached. Information and communication technologies (ICT) are working through the schools. ICT integration is the topical requirement of everyday life and plays an important role in society globalization.

The facts that the knowledge obtained by the pupils and students is formal and that the level of grasping new concepts is very low are commonly known. We are facing a possibility of ICT and thinking of how this alarm situation could be improved and biology teaching should become more attractive. However, while using ICT we run into a number of problems e.g. the teachers' fear of using ICT. If the teachers go through these obstacles, they will discover the new possibilities brought in biology teaching by ICT.

The article discusses the students' point of view on the how teachers in Slovakia use ICT in secondary grammar schools.

Research Methodology

We focused on the students' point of view on how the teachers use ICT. We created our own measuring tool. We applied a method of questioning because of a large-scale inquiry of data. The questionnaire was evaluated by the teachers from the Department of Didactics in Sciences, Psychology and Pedagogy of the Faculty of Natural Sciences. Having finished the evaluation, we sent the questionnaires to schools. The questionnaire concentrated on different aspects of using ICT but we made a contribution towards showing how the teachers used ICT from the students' point of view. We received 270 filled in questionnaires from nine secondary grammar schools. The questionnaires were distributed in April 2005 and received in June 2005.

Analysis of Scientific Information Sources

There are a lot of authors encountering problems with ICT. For example, Cox et al. (2003) points out that teachers use ICT discussing their subject, and thus the students better understand it. The most powerful effect is achieved when the students alone or in groups apply software focused on a particular task. Osborne and Hennessy (2001) reported about the effect of presenting information with using ICT and a positive effect on the student's interest in biology. Salinger (2004) asserts that ICT can make the education quality better, because the content of multimedia helps with illustration and explanation of demanding concepts using the methods inaccessible through the sources of traditional methods and learning. ICT do not meet the task to be attachment or supplement to teacher's preparation, but they offer the infinite access to information, which is accessible without any effort due internet (Gilmore, 1995). Yu (1998) used teaching supported by a personal computer and found out that the improvement of students' performance and their attitudes to natural sciences were making better. Soyibo and Hudson (2000) found out that the students' attitudes were statistically significant towards biology in the experimental group (teaching with using a personal computer, digital projector etc.) rather than in comparison with the control group where the methods of lecture and discussion were applied. There is an example from another subject which is mathematics. Jabaidah (2002) found out that elementary school learners were more motivated to learn separate parts of a subject if used ICT to teaching.

Results of Research

The first shown item refers to using didactics tools and is an open – ended object. Table 1 indicates that the majority of the students (75%) of secondary grammar schools agree that the most of the teachers use slides and an overhead projector. The second most frequently used tool was videotapes (34,07%). A weak

point is that only very few students mentioned using compact discs (CD) or digital versatile discs (DVD). Table 1 reveals an interesting situation clarifying that 10% of the students state that their teachers do not use any didactic tool.

Table 1

The proportional representation of the didactics tools (%)

Didactic tools	Proportional representation
Slides / overhead projector	73.33
videotapes	34.07
Slides/streopticon	7.78
Compact discs (CD)	15.56
Digital versatile discs (DVD)	4.44
Diskettes	8.15
Fncyclopedias	1.48
Herbarium	2.22
Simulations	5.56
Pictures	3.70
No tool is used	10.00

Using a didactic technique is closely joined with using didactic tools. This question was an open – ended one. Table 2 indicates that nearly 75% of the students claim that their teachers use an overhead projector. A similar situation is with using slides and an overhead projector. The second most often used technique is video (VCR). This technique is used by one third of the teachers. We found out a statistically significant deviation between the genders (VCR) ($\chi^2 = 4,8791$; $p < 0,05$) in favour of boys. Personal computers are used less frequently as only 16,3% of the students mentioned that their teachers did not use computers when teaching biology.

Table 2

The results of a chi – square test according to the findings of significant deviations between the genders. The answers to the question *What didactic technique does your teacher use?* and their proportional representation

Didactic technique	The value of chi - square	Proportional representation (%)
Overhead projector	1.0337	72.59
Digital projector	0.1302	12.22
Stereopticon	0.172	7.41
Television (TV)	0.2291	9.63
Video (VCR)	4.8791*	33.70
Personal computer (PC)	1.7907	16.30
Notebook	0	4.07
Camcorder	0.1827	1.11
Digital camera	0.1827	1.11
No technique is used	0.7475	16.30

**statistically significant deviations between the genders $p < 0.05$*

The other part of the questionnaire points out what educational compact discs are used by the teachers of secondary grammar schools from the point of view of the students. It was an open – ended item. Figure 1 shows that the teachers use 6 educational compact discs dealing with the questions of biology. But the problem is that the usage of these discs has been mentioned only by 10% of the respondents. A part of the students affirm that their teachers do not use any educational compact discs during the biology lessons.

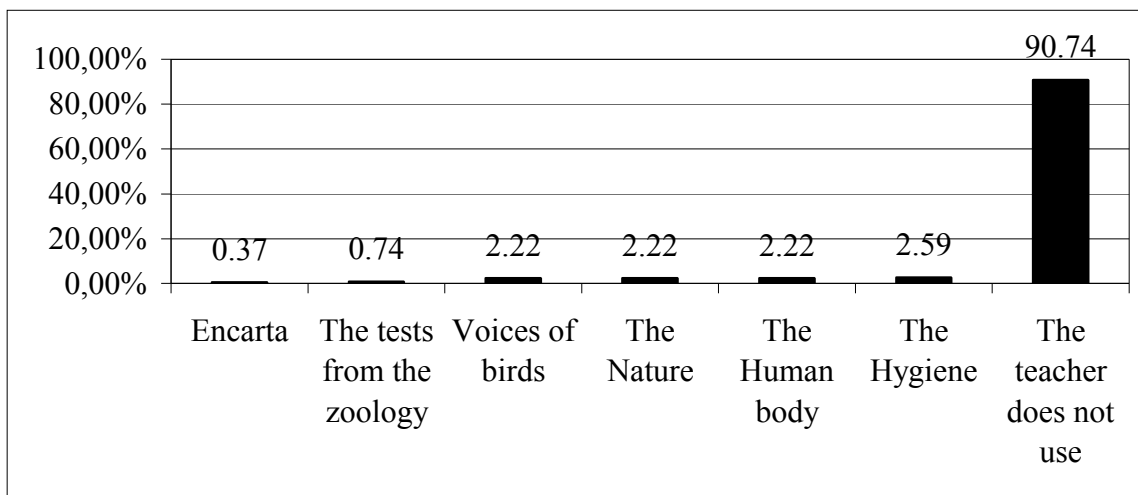


Figure 1. The usage of educational compact discs of biology (%)

The questionnaire includes an item connected with the previous one. We asked, if the students know any educational discs of biology. It was an open – ended question. In this case, the situation was better, because the educational discs were known by the one fourth of the students. Table 3 discloses that a human body was mentioned more times (12,22%). We found out statistically significant deviations between the genders ($\chi^2 = 4,9553$; $p < 0,05$) in favour of boys.

Table 3

The results of a chi – square test according to the findings of significant deviations between the genders The answers to the question *What educational compact discs of biology do you know?* and their proportional representation.

The educational disc	The value of chi – square test	Proportional presentation (%)
No information	2.3189	77.41
The Human body	4.9553*	12.22
The Zoology	0.1	4.44
Encarta	0.0046	3.33
Move my bones	0.5608	3.33
The hygiene	1.4065	2.96
The Nature encyclopedia	0.389	2.59
The Nature	0.0211	2.59
Voices of birds	0.0489	2.22
Different	0.0323	2.59

* statistically significant deviations between the genders $p < 0.05$

We have also tried to find out the purpose of using ICT by the teachers. It was a multiple choice item. The students could check one or more possibilities. The possibilities were:

- a) motivation
- b) oral testing of knowledge
- c) making a new topic
- d) final resuming of the topic
- e) the teacher does not use ICT

The most frequent answer was *the teacher does not use ICT* mentioned by 35,19% of the students. Figure 2 shows that a similar percentage accepted the possibilities of *making a new topic*.

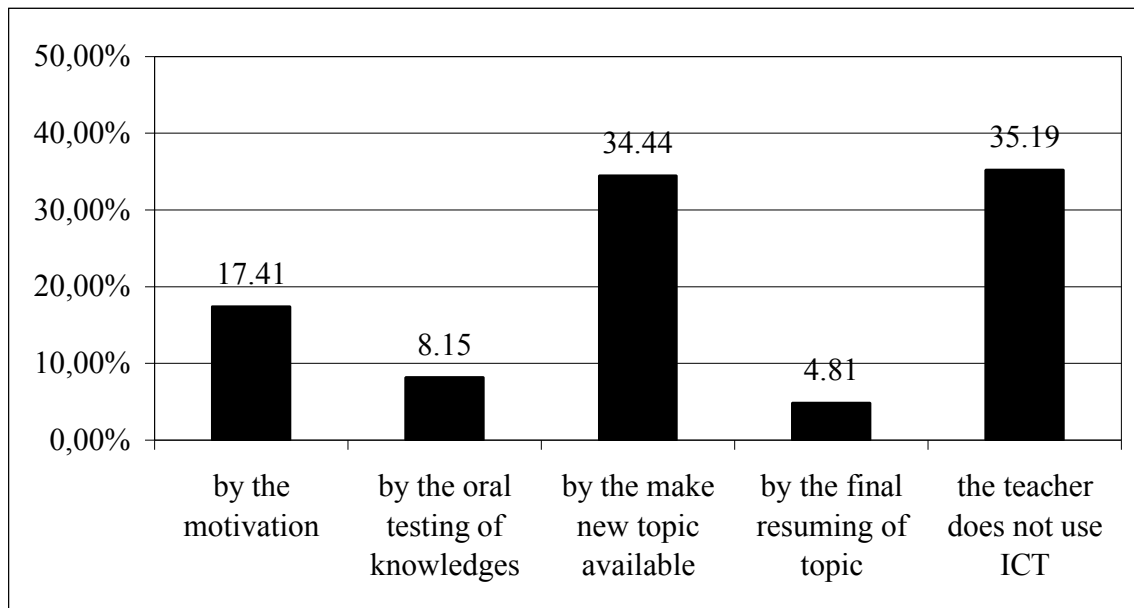


Figure 2. The purpose of using ICT by the teachers (%)

Conclusions and Discussion

A questionnaire method as a research tool was applied in the investigation. A similar method was used by Kovac (1999) who found out how the students of high schools evaluated the usage of ICT in chemistry teaching. Our research proved that the teachers strictly limited the usage of ICT in biology teaching. Similar results were mentioned by Patterson (2000). The reasons are as follows: a) fear of using ICT; b) teachers do not know to use ICT; c) schools are poorly equipped with ICT; d) only informatics' lessons are taught during the ICT classes. Yong (2003) mentions that ICT are accessible at schools and the teachers use them only by adoption of a classical learning method. Therefore, the students' interest in natural sciences is decreasing. The lack of skills using ICT is one of the reasons why the teachers do not use ICT in teaching biology. They do not use the educational discs of biology while learning this subject, because they do not know how to install a certain program and how to use it. A similar possibility is mentioned by Ng and Gunstone (2002). These two authors show that the reason of not using ICT is lack of software in schools. Another reason of poor using ICT is old-fashioned relationships among the teachers in schools. ICT are something new for teachers over 50 and older. A similar fact is discussed in the article written by Ferrero (2003). He mentions that a modern technique is hardly understandable for the older teachers.

Recommendations

For improving the usage of ICT, information about how to apply personal computers, digital projectors, camcorders, digital cameras etc. is necessary for teachers. To fulfil the purpose, different courses need to be organised. Moreover, all schools should be equipped with software and hardware including educational discs of biology, establishing ICT rooms for biology teaching etc..

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