



TEACHER TRAINING MANUAL

MULTIMEDIA APPLICATIONS
FOR EDUCATION

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Part 3A: MULTIMEDIA

Chapter 1: How to use Multimedia languages in didactics

In.For.Ef (BE)

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PART THREE / A

MULTIMEDIA

Chapter one: How to use Multimedia Languages in Education

In.For.Ef (BE)

1. Introduction

Methodology of work with educational multimedia material is not an easy task for the teacher who is used to working according to traditional principles of teaching. However having overcome certain difficulties (most frequently of psychological nature) this style of work may prove to be very satisfying for teachers and their students as well.

In order to achieve an increased educational efficiency a long term strategy must be planned. It will depend if the role of multimedia material is to fulfill in educational process both from methodological and technical point of view which is in fact dependent on the place and manner of teaching. It is advisable to consider the following possibilities:

- The process of learning and teaching is only based on multimedia material. This assumption calls for an easy access to a computer room.
- Multimedia material must assist the process of teaching (presentation of video sequences, animations, simulations of experiments). In this event only one computer is needed in the classroom (preferably connected to a TV monitor).
- Multimedia must be used to practice the students' skills and test their knowledge (doing tests, tasks and exercises). Again one computer in the classroom will be sufficient. However the students should have access to a computer room once or twice a week (possibly for individual studies).
- Multimedia material is used for multimedia testing (doing tasks and tests or a class test with tasks and tests sent to students via the network). This assumption calls for a computer in the classroom as well as access to a computer room.
- Multimedia material constitutes an additional source of information. It must be available at school library (either to be used in the library or to be rented for home study).
- Multimedia material must be used by students exclusively at home (the teacher may recommend doing certain exercises and tasks or solving a problem. This assumption requires an easy access of most students to a computer).

Pedagogical research on the efficiency of the educational multimedia material is to answer the following questions:

- What does educational efficacy of multimedia material mean when compared to other didactic?
- Does the structure of the multimedia product influence the efficiency of learning and its individualization?
- Does the work with the multimedia product influence a better understanding of the material and does it shorten the time needed to acquire knowledge?
- To what extend does the multimedia product increase the number of correctly solved problems?
- Does using multimedia material contribute to develop student's cognitive activity as well as improving their skills?

2. Analysis of multimedia software

2.1 “The Mechanisms of Chemical Reactions”

We refer to the paper written by H. Gulińska and M. Bartoszewicz, Faculty of Chemistry, Department of Chemical Education, Adam Mickiewicz University, Grunwaldzka 6, 60-780 Poznań, Poland.

www.formatex.org/micte2005/382.pdf

This paper presents a piece of multimedia software “The Mechanisms of Chemical Reactions” which contains animations illustrating subsequent stages of selected organic chemical reactions, videos illustrating the execution of chemical experiments as well as texts, hypertexts, interactive exercises and tasks.

This software was prepared in **Macromedia Authorware** environment with the use of **Flash**. Thanks to internal script language, *Flash* animations can interactively cooperate with their viewers. Videos illustrating the course of chemical experiments when the discussed mechanisms of reactions take place were prepared at the film studio of the Institute of Didactics of Chemistry at Adam Mickiewicz University in Poznań.

The software has an open structure which means that it is possible to include new mechanisms of reactions.

Each module includes

- Texts and hypertexts relating to the topic of the experiment
- Sets of animations explaining the mechanisms of chemical reactions
- Dynamic models of chemical compounds
- Sets of videos presenting the course of the experiment
- Information on laboratory techniques
- Sets of safety regulations for experimental work
- Interactive glossary
- Tasks, exercises and self-check tests

Fig. 1-4 Animations of the mechanisms of chemical reactions.

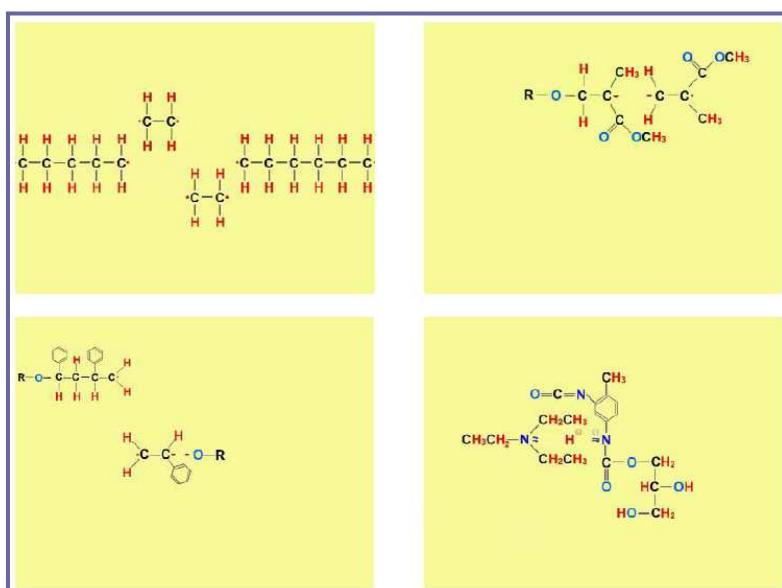
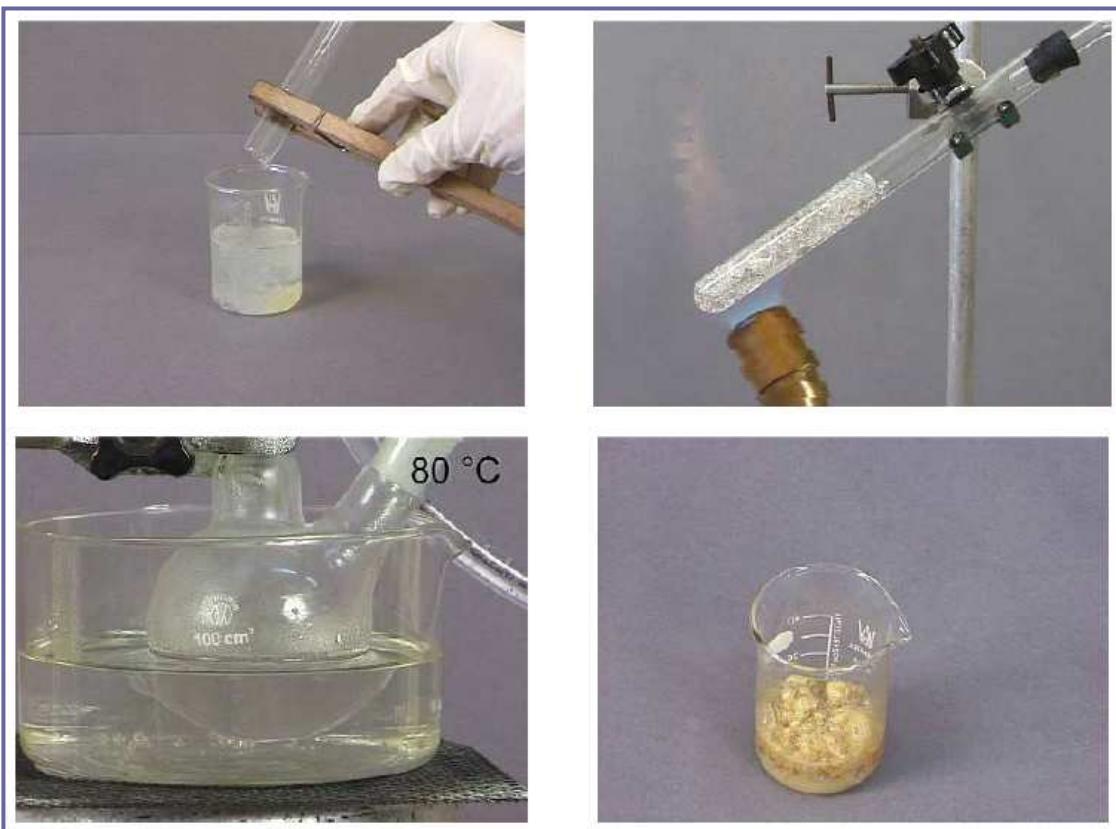


Fig. 5-8

sequences showing the course of reactions.

Video



2.2 StarBoard

An interactive board was used during computer assisted Chemistry classes. This board is a device which combines the elements of a screen for presentations, self-copying board and computer monitor. As the board may be connected to a computer via a cable or via an infra red connection (wireless) it is possible to carry out dynamic work and continuously save the notes on the hard disk.

Electronic pen is the device which the user may write on the board (no ink required – an alternative for the traditional whiteboard). The software of StarBoard makes it possible to stop the presentation at any moment, transfer any of its elements to the environment compatible with its software and to modify it freely.

Using StarBoard and its software will allow presenting the mechanisms of chemical reactions in a dynamic way thus replacing the omnipresent diagrams, drawings and static notations which illustrate the course of reactions by means of the equations of reactions. The user of StarBoard may also print out the materials from the class which might eliminate making detailed notes from classes and direct the students' attention to the subject of the class.

Moreover the dynamic manner of teaching allows the teacher to do problem tasks directly on the elements copied from the presented software thus eliminating the need to prepare additional presentations which will shorten the time the teacher must spend preparing for the class.

Fig. 9-12 The course of a class with the use of interactive board.



2.3 Scenario of computer assisted classes

"The Mechanisms of Chemical reactions" and the StarBoard were used during this class:

- Introduction to esterification reactions (multimedia software in co-operation with the board – texts, films and exercises)
- Instruction to the experiment Production of ethyl acetate (having watched the video sequence showing production of ester, the students carry out the experiment on their own and write down their notes on the interactive board)
- The mechanism of esterification (animation illustrating the stages of reaction including transitional products – the possibilities of the interactive board are used whilst discussing the course of esterification, the students' activity may be expressed while they write down the equation of reaction)
- Modelling the substrates and products of reaction (animation showing dynamic models of chemical compounds – the students build identical models of sticks and balls and then write down summary formulae and the names of compounds on the board – competition)
- Revision of material with the use of interactive board (blank test)
- Test (interactive multiple choice test)

3. Language learning with multimedia games

3.1 The European project “I speak therefore I write”

The programme “I speak therefore I write” is one of the most relevant electronic contents already produced in the framework of previous projects financed by the European Commission.

From October 2003 till October 2005 teachers and experts in French language teaching from 7 European countries worked in this project in order to help all pupils who face difficulties with the process of learning to read and write in French.

An innovative approach has been successfully experimented in countries where French is the mother tongue and therefore the day-to-day language of the whole population, as well as in countries where French is taught as a second language.

In order to make language learning more attractive, the partners of the project conceived multimedia games which can be easily adapted for all levels of learning. These games and exercises are interactive and fun. Moreover multimedia games allow pupils to practice on their own, and help them to build self-confidence as they learn to communicate and express themselves.

This multimedia material was realised with Macromedia Flash. The advantage of this educational material is to merge different media (texts, sounds, images, animations) so that pupils receive information by different ways. Pupils' attention and understanding abilities are therefore increased.

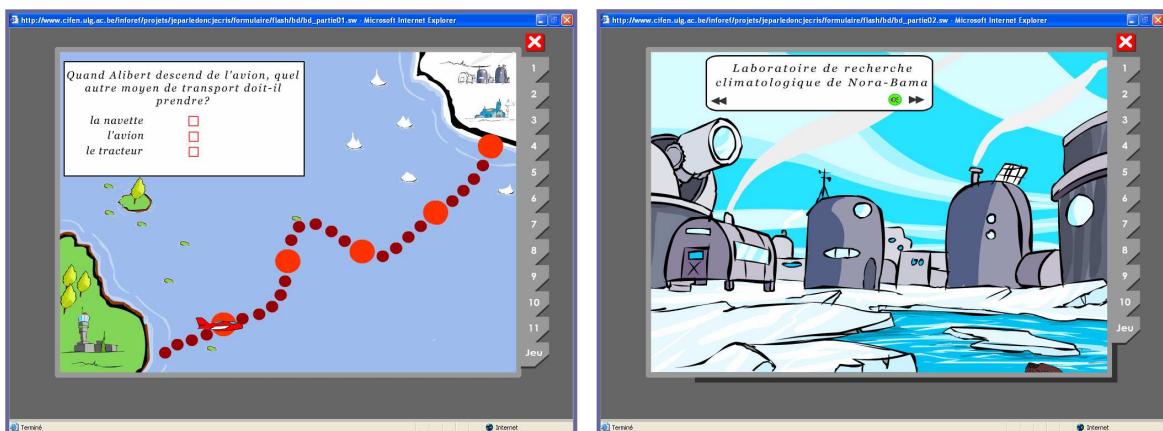
For example, the pupil can read and hear the instruction of a virtual character who explains the objective of the game and how to achieve it successfully.



When the pupil achieves the game with success, the virtual environment gives him a positive or negative answer. The reaction is unexpected and sometimes surprising. For example in the following game, the pupil has to click on the sound “i” in the words which appear on the screen. When the answer is correct, an animation shows the activities of the letter “i” for each day of the week. Appropriate sounds can make the game more attractive.



A strip cartoon becomes a multimedia game in which the pupil can read and hear a story, answer to some questions in order to check they have understood the main events.



Through an interactive story, pupils observe and resolve the most common difficulties of the French spelling.

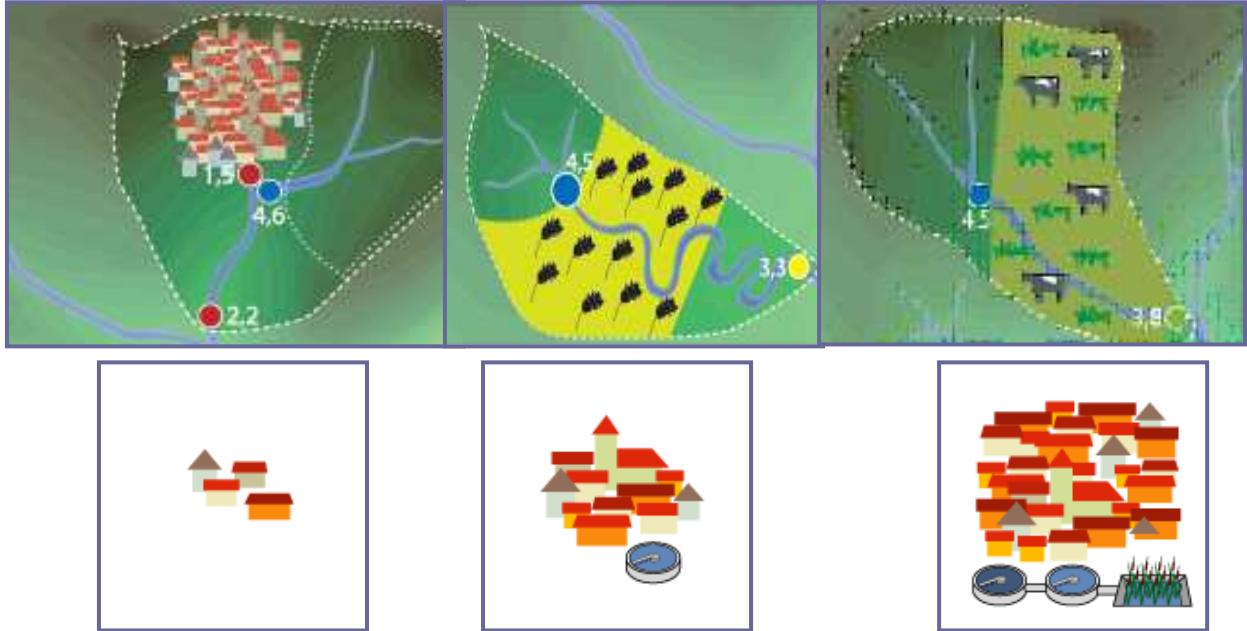


4. Simulation software for environmental sensitisation

4.1 “VirtVal, the virtual valley”

In the framework of the European project “eurEAUform@”, teachers and experts from 4 European countries conceived this multimedia material in order to train pupils and students for an effective use of water resources.

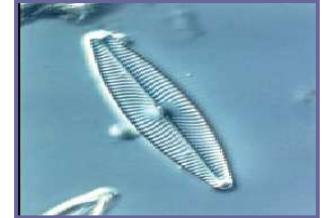
“VirtVal” is an interactive application, which shows you a valley in a temperate climate zone. You can keep the natural forest or you can replace it by agriculture or settlements. Everything you change will influence the water quality. You can decide between economic changes (advantages: low costs for new buildings, high agricultural outputs,...) or the most effective use (cleaning of sewage, reducing of pesticides, ...)



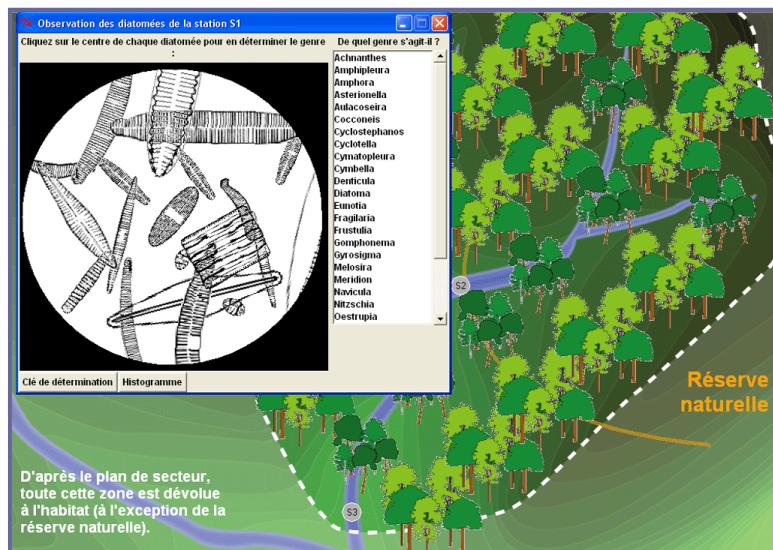
You can check the water quality in different check points:

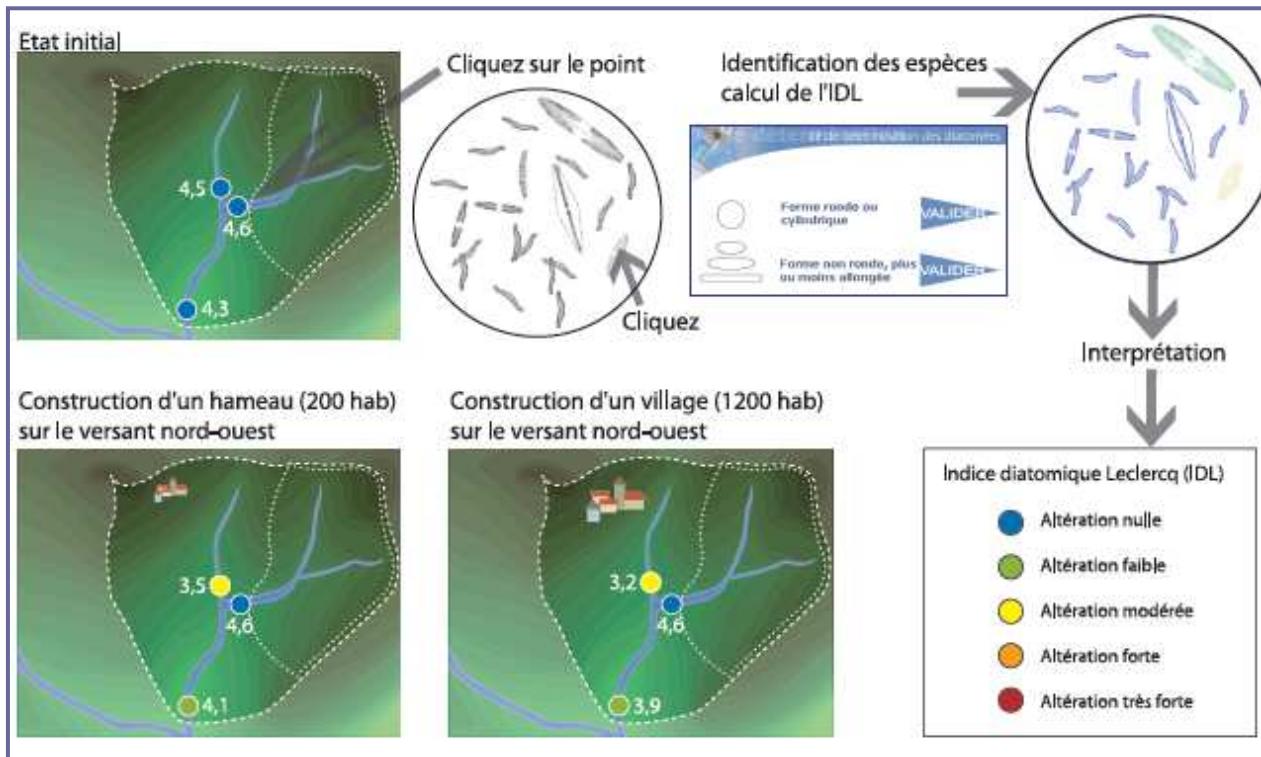
- before human interference
- after every changing in the use of the area
- after every improvement

How?



"VirtVal" uses bio-indicators which are in all running waters and which indicate even the tiniest change in the water quality: the diatoms. The diatom is a type of alga which is very small and notably sensitive. The diatoms are almost unknown by teachers, because no microscopes are usually strong enough to show them.





Here is one of the most important advantages of simulation tools for education: the use of interactive and multimedia technology allows realising virtual experiments which are not applicable in the real conditions, for different reasons.

Software:

<http://inforef.be/swi/virtval.htm>

Information for users (in French):

http://inforef.be/projets/eureauforma/mode_d_emploi.doc