



Teach for the future

Teaching in a computer lab



Dr. Hans-Friedrich Vahlensieck

Foreword

"We live in a fast-moving time". Everyone has surely heard this saying or even used it themselves.

The evolution of the internet is just beginning to change our workplaces and our society, but this change is just the beginning of a process which will be easily comparable with the industrialization.

We must not only *react* to these changes but also *be pro-active*. As a teacher it is my goal and our task to prepare the students for the demands of the world of tomorrow and this, apart from other things, requires from us the active use of "new media". Children normally have virtually no fear of contact with new things and it is just a case of channelling the existing enthusiasm.

Giving up the well-known to take on "new media" is a large challenge for a teacher. But we do not see this reorientation as an obstacle but as a chance to make the lesson much more multi-faceted and full of variety than it was in the last century.

It is the success in learning that will finally demonstrate we are right.

Dr. Hans-Friedrich Vahlensieck
Ettingen Switzerland



Table of contents

Foreword.....	1
The problem.....	3
Teaching in a computer lab: Requirements and possibilities	4
Creating a presentation for the PC	4
Presentation media.....	6
<i>Projectors</i>	6
<i>The hardware video network</i>	7
<i>The software video network</i>	7
Tips for the implementation of the presentation.....	9
Teaching in a computer lab: A practical example.....	10
The demonstration block	11
The presentation aid MasterPointer	13
The practice phase for students	17
Offering help.....	20
Presentation of the results.....	21
Filling out the results sheet.....	21
Questions concerning filling out the sheet.....	22
Final comments	23

Introduction

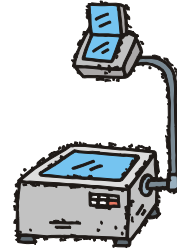
Even at the end of my school days, at the beginning of the 80's, the overhead projector was still considered as progressive, and naturally not every classroom was equipped with one. If a teacher wanted to use one, he had to bring it himself out of the teacher's room into the classroom.

Only rarely a teacher used such an aid. There were also no laser printers at that time and thus the slides had to be more or less legibly written in colored felt tip pens by hand.

As Information Technology (IT) was being taught in higher grades, the whole school of about 1,000 pupils had just two PCs (and these days we would probably not even call them PCs anymore).

I believe that most of us think back on those days and even smile in an amused way about them. The overhead projector today is a standard item, but one must not forget that this time was just barely 20 years ago.

Most schools today are supplied with a well-equipped computer lab. And still, one PC per student is probably not seen anywhere, and the often discussed internet access is the exception, but for how much longer?



Will there still be printed text books in 20 years from now or are all sourced available only on the internet? Will every student have a flat screen in his desk? Can the homework still be left at home since everything is networked together? We will see!



Notes

The problem

The use of computers / networks in school lessons covers primarily the following three areas:

- ▶ Pupils learn how to work with a computer in special training sessions (operation of programs, programming languages).
- ▶ Access to the internet allows the teacher to guide pupils through their own research on specific topics and to document and evaluate them, etc.
- ▶ The teacher uses the computer as a tool to demonstrate and pass on the contents of the lesson e.g. in the form of a presentation.

Which instructional methods and which additional media are necessary in order to arrange a meaningful lesson plan and to achieve a high learning effect?



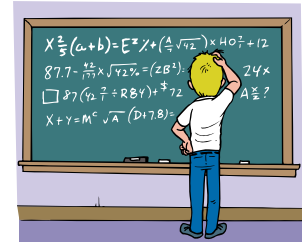
Teaching in a computer lab

Requirements and possibilities

Creating a presentation for the PC

A presentation can be created to be as multi-faceted as the present day conventional lesson given from the front of the classroom. There are hardly two teachers who would teach the same material in an identical manner and, in the same way, each teacher can choose the form of his presentation which best suits his teaching style or the topics to be handled.

- ▶ The teacher can show something to the pupils “live” on the computer (e.g. how to fill out an exercise sheet on the computer, how to gain access to the internet etc.).
This type of presentation is not too complex and requires only little preparation while high quality can be achieved quite simply, still.
- ▶ A teacher can use a presentation program (e.g. Power Point) to create his own presentation and then use it by simply pressing a button during the lesson. The preparation of this presentation can take a lot of time depending on the type chosen. The effort is probably worth it, since a presentation which has been developed once can always be used again, modified and possibly also used as a set of modules.



- ▶ Complete presentations on various topics can be made available on the internet.



The maximum attention is naturally won by presentations when they are created in a multimedia style through the use of video sequences, sound (noise, music), animation (comics) etc.

Notes

Presentation media

How can I show a presentation to the pupils?

The simplest and cheapest possibility is, to gather all of the pupils around one screen. This approach has a limitation of up to four pupils. What other professional ways are there?

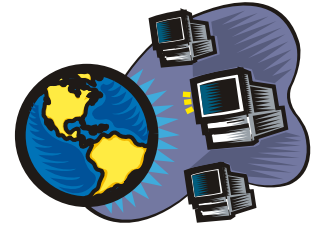
The projector:

The teacher's screen on which the presentation is running can be projected onto the wall with the help of a video projector (comparable with a slide projector). Projectors can often be found in large auditoriums. There must be good dimming of the lights so that the picture can be seen well, or there must be a projector available which has a higher light intensity. Projectors, particularly those with a higher light intensity, are still very expensive. If a projector is used in the computer room, the picture on the teacher's computer will remain visible, also during the practice period, and the teacher cannot block the pupils' computers in order to direct their attention to the presentation. This is possible with the following systems.



The hardware video network:

The hardware video network transmits the screen contents over a cable to all computer screens in the classroom. The lights in the room do not need to be dimmed with this system and the presentation has good optical qualities in small groups (6-8). The picture, in the case of larger installations, is significantly blurred for the further distant screens. The refresh frequency of the monitors and the selected resolution are also limiting factors. (Often only 70 Hz and 800 x 600 points).



The software video network:

In the case of the software video network, an installed program is used to transfer the contents of the teacher's computer screen to the pupils' computers. The software video network takes advantage of the existing network (which is of course already present for accessing the internet) and has simply to be fast enough (10 MBit). There is, compared with the hardware video network, no need for additional cables, wires, etc.

This method has, like the hardware video network, the further advantage that it is independent of the light quality and the sitting arrangement of the room and even students in the back seats will not be disadvantaged. A broad range of additional functions are possible for an interactive lesson with the software video network which goes far beyond simply pure distribution of the picture.

The software video network thus represents one of the most modern and, at the same time, extremely low-priced solutions and is the method to be selected. Today's standard for software video networking is named Vision. Our practical example will be based on this programme and the additional tool MasterPointer.



Notes

Tips for the implementation of the presentation

- ▶ A presentation can naturally be interrupted at any time if a question arises during class. Unclear points can be clarified on the board.
- ▶ For longer presentations it is recommended to write the key points on the board or to write them on the overhead projector so that they are permanently visible as the presentation proceeds.
- ▶ It should also be possible for the pupils to take notes and for this the teacher can also print out the presentation and hand it out.
- ▶ Do not forget either, to change the medium used from time to time to keep up the motivation to learn.



Computer presentations are also remotely operable (e.g. with a wireless mouse). The teacher can walk around the room but also continue to control the presentation. This can make the lesson more relaxed, the lesson becomes more personal and learning barriers (the teacher is too much "at the front") are reduced.

Until now we have only been talking about presentations, that is teaching from the front of the classroom, but the PC network is equally suitable for group work, projects and workshops.

Teaching in a computer lab

A practical example

It is my intention, based upon the following (fictitious) training sequence, to show which learning methods one can use with the medium of the computer network. We are using the software from Vision (MasterPointer and MasterChat tools are integral parts of Vision!) as an instructional tool.



In my opinion, there is no other product on the market at the moment which comes anywhere near this one concerning functionality and speed. A special keyboard makes the operation of Vision even more simple, but is not required necessarily (optional).

- The learning environment: Each student has his own PC provided with internet access.
- The subject: A biology lesson (Biochemistry) at the higher level
- The goal: The students will gather information from the internet about carbohydrates.
- Assumptions: Most students have little experience with targeted searching on the internet (browsing).

The demonstration block

The first thing I do is show the students how to start the internet browser and how to operate the search engine. Here the PC is used as a pure presentation instrument for training at the front of the classroom.

I can make my monitor screen visible to the students by simply pressing the DEMO key on my Vision keyboard (as an alternative to the Vision shortcut list). After undergoing a start-up time of about one second the contents of my screen will then appear on students' screens. The keyboard and mouse at the student workstations are all blocked so now I can begin with the introduction.

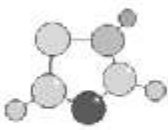


- ▶ *It is conceivable to consider the use of a projector or video networking hardware as already discussed in the theory section.*
- ▶ *Something to try out later: If my screen just appears as a window on the students' computers then I must press the button called: <<Demo full screen>>.*
- ▶ *There is also a partial picture demo available: If an explanation has to be repeated the student can decide whether he wants to see the presentation again or whether he wants to continue working.*
- ▶ *Using Vision in minimized demo mode, the demonstration screen is only present on the students PC task bar. Still, every student can see the picture of the lecturer's screen any time he needs to.*

Internet Explorer - Microsoft Internet Explorer

Address: http://www.Edge.org/chemistry/20/cont/101116.htm

Ions and Small Molecules




- [Major Molecules](#)
- [Aliphatic Hydrocarbons](#)
- [Alkenes](#)
- [Alcohols and Ethers](#)
- [Esters, Amides](#)
- [Gases](#)
- [Sugars - Carbohydrates - Monosaccharides](#)
- [Semi-conductors and Organic Solids](#)
- [Aromatic Hydrocarbons](#)
- [Organic Acids](#)
- [Liquids](#)
- [Literature and Internet Resources](#)

The sum of all the formal charges is called [charge neutrality](#). It is a consequence between primary and secondary metabolites. The [secondary metabolites](#) contains all pathways necessary to support the cell alive. In the [secondary metabolism](#) the compounds produced are broken down that are essential for the whole organism.

The [cell's composition](#) can be grouped into three different classes: [biological ions](#), [small organic molecules](#) and [macromolecules](#). Macromolecules comprise again three classes of molecules: [proteins](#), [polysaccharides](#) and [nucleic acids](#).

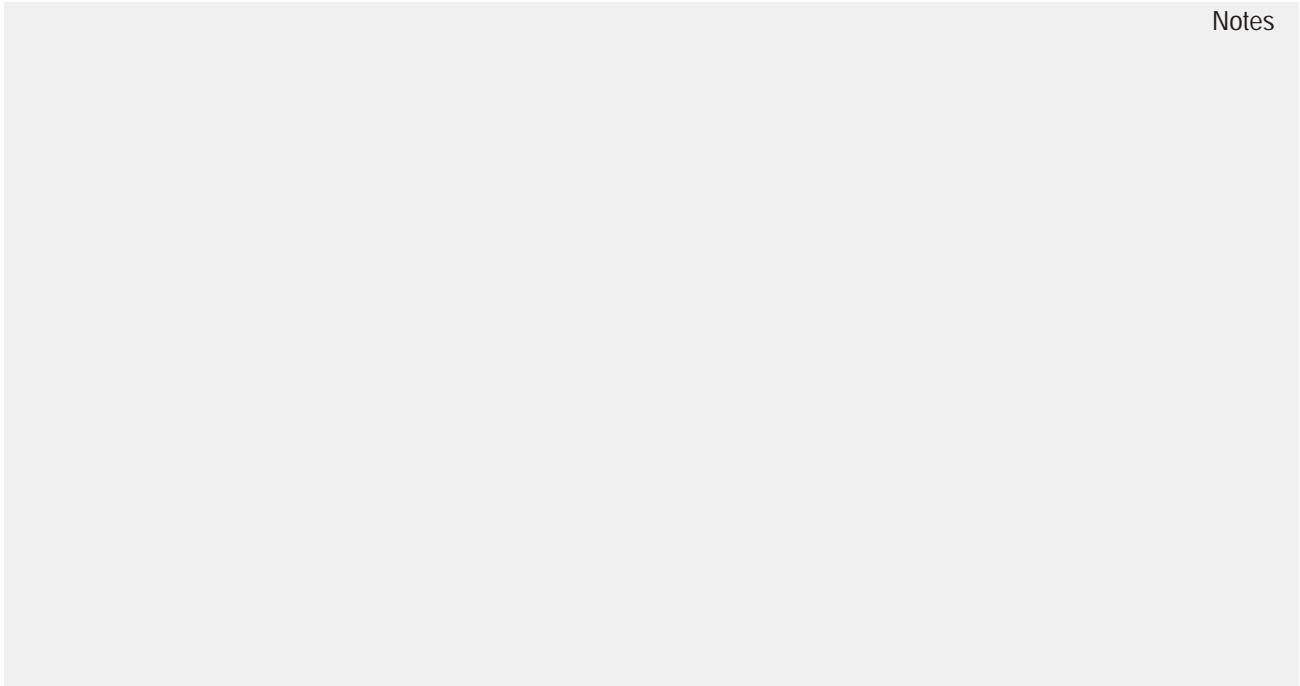
"It has already been recognized earlier that we have examined nothing of a plant's life as long as we have not discovered the physical or chemical processes that underlie or lead exactly for this in a manner which is necessary that we start our studies with the smallest part, the single cell. That we will arrive quite a long way, if we start from the leaf, is understood, considering the great complication of their almost physical phenomena." (From H. V. SCHLEIDEN'S [Grundriss der Pflanzenphysiologie](#), Braunschweig, 1843)



The 3-D ball-and-stick model of the atom, often called the [space-filling model](#). As shown for a hydrogen atom, the 2s-orbital surrounds the nucleus of the atom occupying fixed position at the center of the atom. The 2p-orbitals will be shown in the next slide. The radius of the atom was that a closed surface around the core. An outer shell of the atom is very porous and the electron penetrates the

The student screen during the Demo phase.

The following example demonstrates some uses of the pointing equipment of the MasterPointer. MasterPointer is activated simply by clicking on the appropriate icon on the Vision tool bar, then marking the place to be highlighted with the mouse.



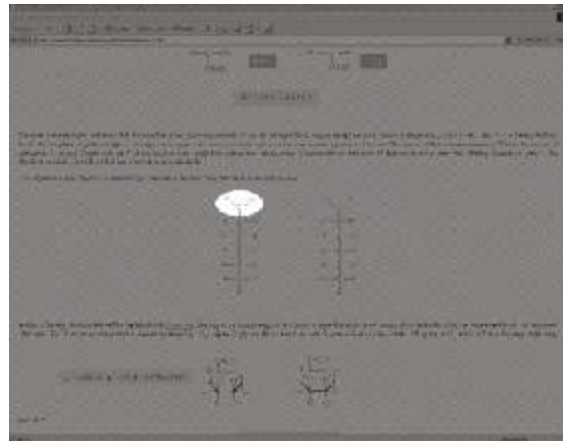
Notes

The spot (spot light) function is the most suitable device to use if I need to explain a particular point on the screen such as the aldehyde group.

The desired point on the screen is highlighted in the reticule of a spotlight ball while the rest of the screen remains darkened. I can now illuminate and explain about the individual groups of molecules as if under a pocket torch.



The diameter of the spot can be very easily adjusted with a pressed right mouse key.



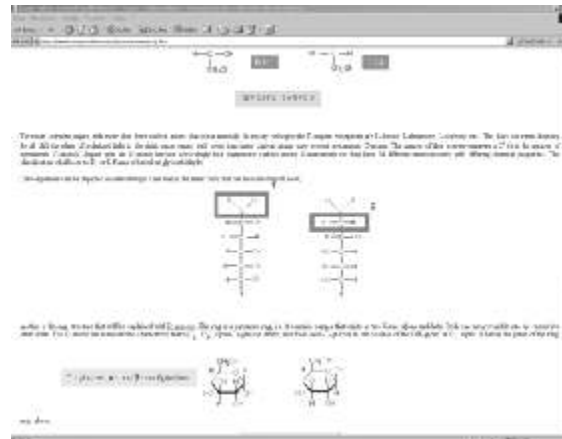
An example of use of the spot function for highlighting parts of the screen.

Notes

After the conclusion of the explanation about the chemical groups, I need to summarize the most important points for the students. The automatic counting frames are a great help here where various sections are provided, one after the other, with consecutively numbered frames.



This function is excellently suited for the visualisation of a number of consecutive work steps, such as when one should explain to the students about the desired order in which a worksheet should be filled out.



The individual steps are automatically allocated a numbered frame.

Notes

Finally, the last thing I like to do is to enlarge the URL address of the internet page. Such particularly small texts on a computer screen are often difficult to read. Here, the magnifying glass function offers useful service where the URL is simply enlarged and is therefore easy to read.



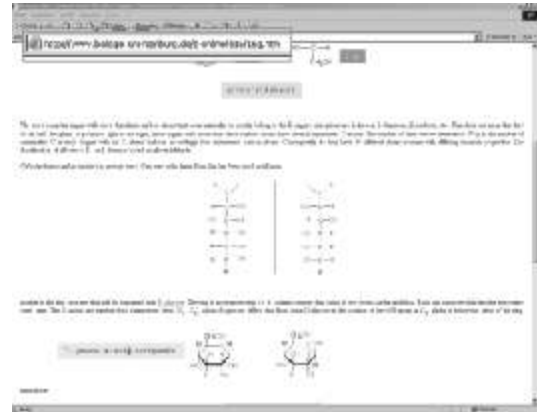
The MasterPointer also allows the most important sections of the screen to be photographed and then printed out.

To stop the demo I simply press the Stop button on the Vision keyboard.

The practice phase for students

The students now spend time reproducing that which they have seen and deepening their knowledge on the basis of the two given questions.

For example, one student asks a question during the practice session which is relevant for all students, I can now lock the other students' screens (PCs) by simply using one button of the Vision keyboard (or click onto the respective icon of the Vision tool bar) to obtain the attention of the whole class instantly. Now, the students can no longer work on their PCs and can concentrate on what is being said.



An example of the magnifying glass function



As the exercise session continues, I as the teacher, wish to have an overview of how the students are progressing. Activities which have nothing to do with the lesson, such as computer games or unrelated surfing on the internet, are noticed and stopped immediately. Also I do not want to be continuously checking everyone by walking through the classroom, I prefer to let the students experiment undisturbed.

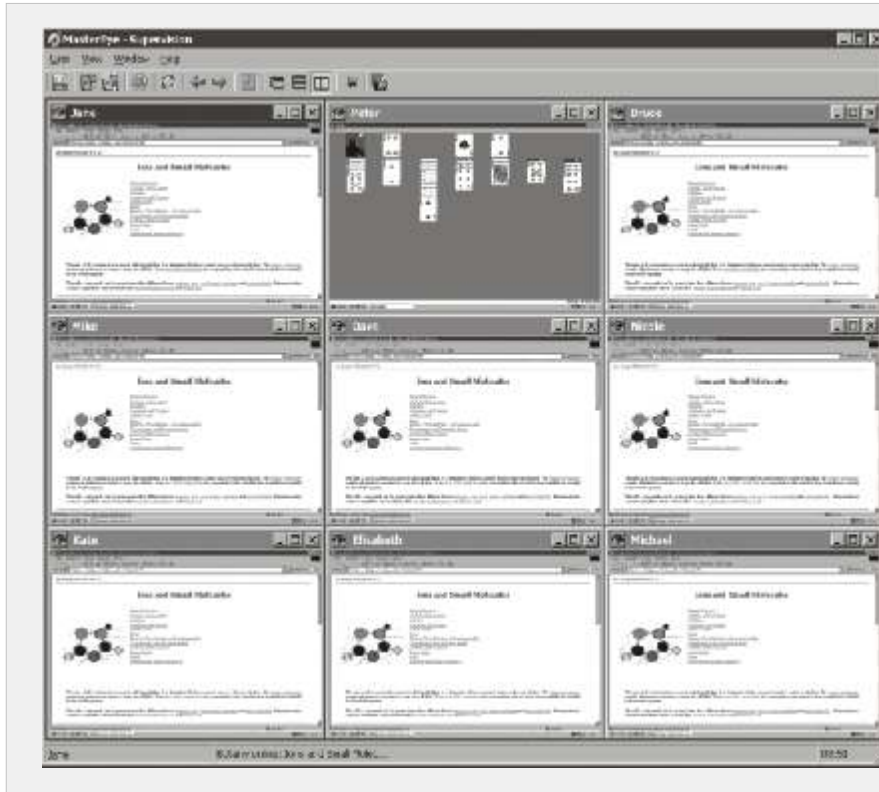
Again, I need just one button in the Vision program to switch to Supervision Mode.

The Supervision Mode allows me to see all of the student screens as a group of "thumbnails" on my screen and lets me monitor them.

An example can be seen on the next page.



Notes



*An example of the
Supervision Mode*

Aha! Peter is playing Solitaire.

Offering help

I would like to have a closer look at the procedures particular students are using while working on their own assignment. Some students get unsure or nervous when the teacher calls them, in front of the whole class or if he/she looks over their shoulder.

In Supervision Mode, it is also possible to blend in screens of individual students without them noticing. Supervision Mode enables the teacher to observe the work of all students at a glance. Struggling students can be identified more easily and help can be provided instantly.

I can also, as the teacher, continuously check my own didactic capabilities and improve myself since I can quickly detect where explanations have been made too quickly or inadequately.



The Supervision Mode should naturally not prevent the teacher from going around the classroom and having personal contact with his/her students, to answer questions etc.

Notes

Presentation of the results

I want now to stop the practical exercises as one student (Martin Fischer) has found an interesting internet page. My intention is, to show this page to the other students and to give some comments. To do so, I first have to select the participant's window and press on the Demo button on the symbol bar: the screen of Martin Fischer is now transmitted to all of the other students' computers. The MasterPointer tool is immediately available for Martin Fischer to use. The student can now explain important points to the other class mates and can, for example, increase the size of the URL (internet address) using the magnifying function of MasterPointer. The students can write down the URL and can use it later for their own research.

Filling out the results sheet

The students should now make a report on the worksheet about the results of their searches on the topic carbohydrates.

I can distribute the worksheets through the network to the students instead of printing out or copying empty work sheets and hand them out. The students fill out the forms on the computer, once they are completed, the sheets will be transferred (copied) back to the practice file or will be printed out directly. This can also be automated after a defined period of time.



Questions concerning completing the form

While worksheets are being filled out, I can still take advantage of the aids mentioned earlier (remote control, the Supervision Mode etc.) to support the students.

Some students may have questions concerning the worksheet. This can continuously bring disturbance into the classroom and may cause further questions from other students.

Vision's MasterChat Mode allows students to converse silently with the teacher through the computer network without disturbing other students!



MasterChat basic functionality would allow students to communicate with each other by using their networked computers. For obvious reasons, this situation may not be recommended in school classrooms, therefore the general chat function is switched off per default. It can, however, sometimes be useful to allow students to chat with each other. For example to get students familiar with the computer in a more playful way (use of the keyboard/mouse) or for writing in a foreign language during a language lesson.



This is where I would like to conclude our example. Although the Vision software has more useful functions, to cover all of them would go beyond the scope of this paper.

Final comments

I hope that you could obtain some useful tips from this paper about how teaching in a computer lab can be used from a practical standpoint of view.

It is necessary to relearn, reconsider, and probably even revise some of our personal teaching styles in the future. But the efforts which need to be made will be valuable because of the positive impact and benefits of the new teaching aspects.

I will do my best to continually improve this edition and am always thankful for any comments and criticism. I would be very happy if I could consider in one of the next editions of this paper case reports from other teachers and trainers, such as you. For any comments, reports, reviews, etc. I like to thank you all in advance.

Please send your comments to the following e-mail address: vahlensieck@academicteach.ch

I hope you have a lot of fun and success.



Author: Dr. H.F. Vahlensieck

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CH-4107 Ettingen

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Please direct further questions to:

AcademicTeach

Schaienweg 4

CH-4107 Ettingen

Info@academicteach.ch



Dr. Hans-Friedrich Vahlensieck

Born in 1965, married, the father of two children, active for the last 12 years in the field of adult education in the IT sector. He founded the company AcademicTeach in Ettingen near Basel/Switzerland 12 years ago and has managed the company since then. He has been developing and giving computer training sessions for AcademicTeach for business and administration. His further activities include a consultancy service for persons responsible for organising training in large companies, as well as the training and coaching of PC trainers.



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