

E-Learning without Text and Language: A Language-Free Learning Model

Hakan KALINYAPRAK

Institute for Software Technology and Interactive Systems
Information & Software Engineering Group
University of Technology
Vienna, Austria
hakan@ifs.tuwien.ac.at

Gerald FUTSCHEK

Institute for Software Technology and Interactive Systems
Information & Software Engineering Group
University of Technology
Vienna, Austria
futschek@ifs.tuwien.ac.at

Georg BLAHA

New Media and Distance Learning Center
Vienna Campus College
Vienna, Austria
georg.blaha@fh-campuswien.ac.at

Edgar WEIPPL

Institute for Software Technology and Interactive Systems
Information & Software Engineering Group
University of Technology
Vienna, Austria
weippl@ifs.tuwien.ac.at

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Abstract: E-learning is usually highly based on language understanding and addresses usually those learners, who have certain basic skills in reading and listening a specific language. Persons that cannot understand the languages that are usually used in e-learning units and also illiterate persons, who are insufficiently educated, are not able to achieve enough profit from many e-learning courses. This paper shows how e-learning makes it possible for certain groups, e.g. asylum-seekers coming from different countries, to learn without using text and language. This paper gives also some examples of learning sequences for self-learning that are completely independent of any language. Learning without text and language is based on the principle of the request for imitating. This principle represents a didactical challenge for the authors of the learning sequences especially in respect to graphical animation of universally understandable gestures, signs and symbols. Of course the lessons learned from this sort of e-learning can also be used in authoring ordinary e-learning content.

INTRODUCTION

In the last 20 years the number of computer-based teaching programs became rapidly larger. An important factor is the rapid development of the hardware sector and the advancement of the software possibilities. In the last years there was an immense rise in the use of computer-based learning programs in teaching. The inclusion of pictures, films and sounds in multimedia applications seems to be a consistent development because texts on a screen are much more difficult to read or understand (see Nielsen, Jonassen & Mandl 1990) than printed texts. In particular, longer reading at the computer screen leads clearly to faster fatigue symptoms.

A multimedia presentation of computer programs offers itself therefore also as a compensatory element (Hoogeveen 1997) for the bad legibility in comparison with the book. However badly arranged multimedia applications can also lead to negative cognitive effects, (Heller 1990) e.g. cognitive overloading and a reduced success in learning.

Text and Language are important parts of e-learning. For multimedia programs text is also indispensable. This paper tries to find out, how learning can be performed successfully without text and language.

How should multimedia based training and e-learning environments be arranged and in which context should they be used? How much text is enough in e-learning?

A note on terminology: this paper uses the terms online learning, e-learning, e-teaching, web based learning, telelearning, and Internet based teaching as roughly synonymous. They are used to refer to educational efforts that in some way involve the use of the Internet.

THE IMPORTANCE OF TEXT AND LANGUAGE IN LEARNING

How important is a Language?

In information and communication systems the central position of natural languages is evident. Language is exclusively human's own method (Sapir 2000) for the transmission of thoughts, feelings and desires that are not rooted in instinct.

The conscious communication is expressed by spoken language, bearing spoken and written language. Unconscious communication is expressed for example by body language. In this paper, if it is not differently described, "language" is always meant as "written language" and/or "spoken language". The term "language" does not subsume other forms of languages such as symbolic languages, computer languages (e.g. Java or C++) or body language.

In our use language means a certain language like German or Japanese. The spoken languages of mankind are divided in language families; on the basis of "Language Codes", languages can be clearly identified internationally. Today in the whole world more than 7000 different languages are spoken (excluded dead languages such as Latin etc.).

Writing is a relatively young technology and must be learned additional to the spoken language. Writing is the process of recording characters on a medium, with the intention of forming words and other larger language constructs. Writing is a system to make spoken language readable.

Information is frequently transmitted linguistically, spoken or written. Knowledge is conveyed by language. Most knowledge in databases is linguistically coded. Language stands also in the centre of the WWW. Nearly no user interface uses no language.

Such a complex tool like "language" brings also problems with itself: nothing is more ambiguous as natural language. Language barriers prevent the communication. Multilingualism, dialects, different cultural areas, geological and political demarcations can lead to different localization of products, terminologies, and incomprehensibility. Therefore authors must exhaust all possibilities of arranging communication successfully by language.

Data processing in the brain

Different information is received over different channels and that has a long tradition in cognitive psychology. The human data processing distinguishes between two kinds of information assimilation: audible and visual. In order to process this information, different channels are used. The visual channel is used for visual information and the verbal channel is used for audio and verbal information.

Although information usually reaches via a channel the working memory, sometimes the channel must be changed during the data processing e.g. when written text has to be read. These jumps between the channels require high resources in the brain. It appears meaningful (Niegemann, Helmut et. al. 2004) to use in multimedia learning environments sequences that use both channels at the same time as economically as possible.

The capacity of the human data processing is limited. Complex information cannot be received in short time. Each channel has a limited capacity. If learners perceive information e.g. illustrations or animations, they can only process a few contents in their work memory. In order to realize all important information in the working memory, one has to regard the same animation several times.

Consequence: As soon as too much information is being offered on a channel, the working memory is overloaded and the knowledge acquisition is handicapped. That is the case, when in a learning content an animation with too much explaining text is presented, because both informations are processed over the visual-graphical channel.

If too much information is processed at the same time on both channels, the working memory can also be overtaxed. Because in this case the working memory must keep a lot of information at the same time active e.g. if many detailed pictures with visually explanations are represented on a display screen, the cognitive overloading of the working memory is very probable.

The simultaneous presentation of text, diagram and audio leads to a cognitive overloading. This was confirmed (by Mayer et al. 1999) empirically. The group of test persons without unnecessary presentation of written and spoken text reached 43-69% more (Kalyuga et al. 1999) correct solutions.

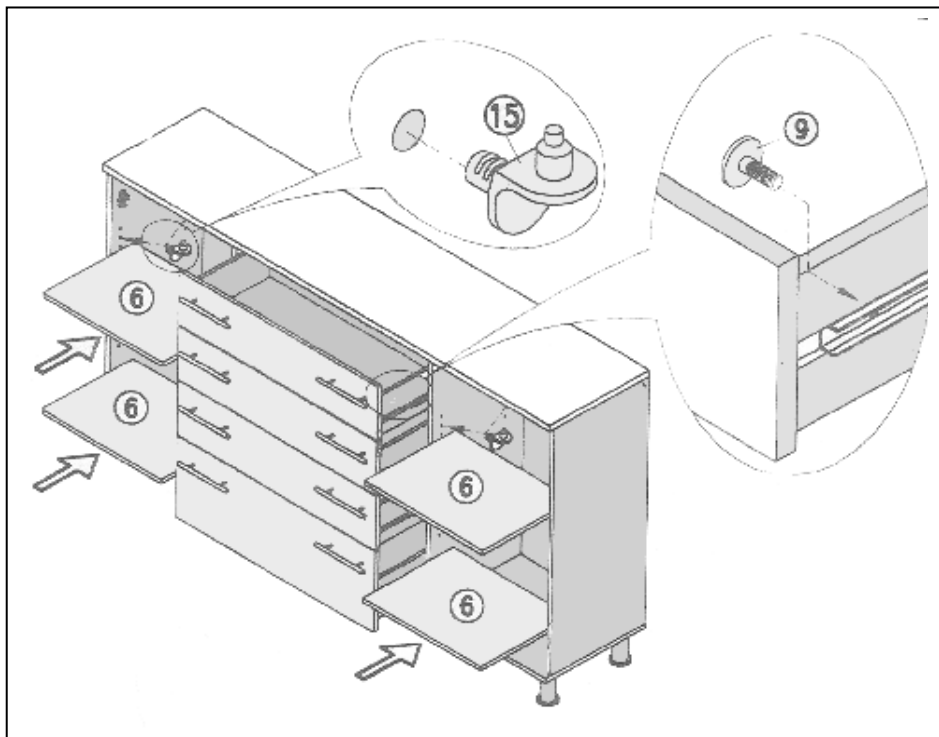


Figure 1: Many assembly instructions contain no text.

A LANGUAGE-FREE LEARNING MODEL

The idea is to develop new e-learning strategies in using less or even no text or spoken word. The learning environment and learning contents consist only of video sequences, animations, illustrations and pictures.

However other learning models are not excluded by this learning model: on the contrary learning without text and language becomes also a part of learning models like explorative learning, learning by doing, problem-based learning.

Life based learning

A very good possibility for learning without text and language is for example the use of real life situations (Life based learning). The human learning process starts with birth by looking and copying and continues steadily up to death.



Figure 2: Texts are sometimes redundant.
Pictures can overcome (Mustienes & Hilland 2004) language and culture barriers.

Examples: Since a long time the concept of the learning without text and language is used very successfully in real life. Until now nearly everyone has to do with assembly instructions for furniture. These instructions use nearly no text and language (Assembly instruction, 2004). Nevertheless these instructions explain everything that is necessary for the assembling. Figure 1 shows a part of such an assembly instruction.

A second example represents the project PCvtv of Carnegie Mellon University, USA. A special computer (and its programs) is developed (see PCvtv-project 2004) for users that have no or only a low level school education. It supports these people to use most communication equipments like television or telephone.

Problems

The development of the learning materials without the two most important components text and language represents a very big technical and didactical challenge. Learning contents must be prepared multi-medial, (Thissen 2003) whereby this is connected with very high costs and high expenditure of time.

DIDACTICAL ASPECTS

A project with students

In a university course "practical studies of didactics" for future school teachers in informatics there was a project to design short multimedia sequences for a group of young asylum-seekers and inmates coming from different countries most of them without understanding of English or German language, imprisoned in Vienna.

The group of our recipients can be described as followed:

- high motivation in learning
- enough time and daily PC-access in an education room in this prison
- no previous PC-experience
- less education and learning experience, they need short units of learning
- no experience/imagination of an office working process

Our students had to work out e-lectures that should explain the basics of handling a PC:

1. using mouse and keyboard
2. basic functions in working with application software
3. basic functions of an operating system

The challenge for the students was to procure these aims without using text and language. With this condition they started designing short multimedia units for the asylum-seekers.

Very soon the students realized that their potential recipients would not understand a lot of their first design ideas. Most of their rough drafts looked like usual lectures but designed without text and language. So they started again but now they first looked for ways to design the explanations with animations and symbols.

In a next step they proofed these graphical explanations be free of intercultural ambiguity (even colours like red and green or some gestures can be misunderstood).

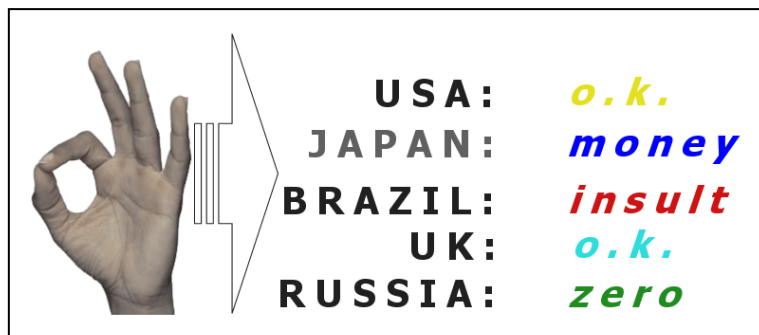


Figure 3: An example of different meanings of the same gesture.

At this point the students began to overwork their design ideas very carefully and looked for information about cultural differences of the recipients of their lessons.

LESSONS LEARNED

- During the process of content development it is necessary to question implicitly presumed knowledge;
- Some content text is indispensable;
- Not every symbol has an intercultural meaning, the recipients may not understand it or even misunderstand it;
- Mimic of face, gestures, noise can be used as intercultural symbols after checking for different meaning;
- Animations may be expensive but they can help to visualize more than static presentations.

SUMMARY

In this paper we describe that text is seen as an ambivalent learning medium. Although text and language are very important for e-learning we show that many e-learning programs can be developed and used without text and language.

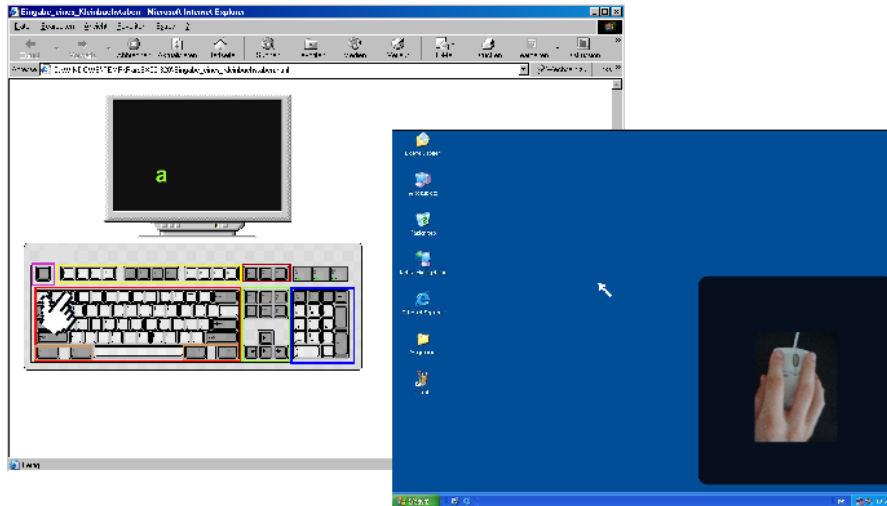


Figure 4: Screenshots of two short multimedia units: using mouse and keyboard.

It is undoubtedly the case that learning is an activity that is irreducibly singular: learning is something that no one can do for someone else; therefore the learning has to be as easy as possible.

The aim of this experiment is to support imprisoned people and asylum-seekers and help them to learn some basic IT-skills. With the described educational experiment we tested a new approach to create online courses without language.

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Author(s)

Hakan KALINYAPRAK, Dipl.-Ing.
Vienna University of Technology,
Institute for Software Technology and Interactive Systems, Information & Software Engineering Group
Favoritenstrasse 9-11/188, A-1040 Vienna/Austria
Web: <http://www.ifs.tuwien.ac.at/hakan>
E-Mail: hakan@ifs.tuwien.ac.at

Gerald FUTSCHEK, Univ.-Prof. Dipl.-Ing. Dr.
Vienna University of Technology,
Institute for Software Technology and Interactive Systems, Information & Software Engineering Group
Favoritenstrasse 9-11/188, A-1040 Vienna/Austria
futschek@ifs.tuwien.ac.at

Georg BLAHA, Dipl.-Ing.
Vienna Campus College, New Media and Distance Learning Center
Daumegasse 5/2, A-1100 Vienna/Austria
georg.blaha@fh-campuswien.ac.at

Edgar WEIPPL, Dipl.-Ing. Dr.
Vienna University of Technology,
Institute for Software Technology and Interactive Systems, Information & Software Engineering Group
Favoritenstrasse 9-11/188, A-1040 Vienna/Austria
weippl@ifs.tuwien.ac.at