

## Software for educational telecommunications: The Dutch "Teleline" package

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Often overlooked in a discussion of the use of telecommunications in education is the instrumentation, particularly the communication software, which guides the user during his contact with an on-line communication or information source. In this article we focus on data communication software and associated support materials developed for teachers in the Netherlands, and use the Dutch experience to offer general recommendations for communication software and its accompanying support materials for educational use.

### 1. INTRODUCTION

Telecommunications offers educators a wide variety of new opportunities. They can update their teaching material more easily, offer new sources of information to their students and develop learning activities in which they and their students can communicate with the outside world [1,2]. No doubt telecommunications can contribute to what teaching is all about: learning about, meeting and dealing with the real world in a structured way.

At the same time telecommunications as an educational tool creates a far more complex situation than we have experienced before in the school. The actors in telecommunications use are the teachers themselves, one of the user groups of telecommunication systems, but also the telecommunication industry, the network developers, the on-line database and information providers, and the software industry. Most likely an individual teacher will not ever have to deal with this conglomeration of actors. His first frame of reference is what he can see on the computer screen while he is connected with a network, and, also more importantly, his second frame of reference: what he can do with the information and with the possibilities for communication [3].

The accessibility of a network for educational use depends greatly on the user-friendliness of the computer system and the databases or communications repositories being offered. This includes aspects such as the query language used, data-structure, content, and costs. These critical factors reflect closely the different roles of the telecommunications actors. In this article we want to concentrate on one of the components that has been largely ignored, but which plays a crucial role in all of this,

namely the software on the user-side. The communication software is an important tool in the teacher's hands, not only for his own use, but especially for the students. A teacher will not be able to greatly influence the network-database configuration, its content, or costs. What he can do is make clever use of communication software that has a good mechanism for the on- and off-line selection and storage of information, which among other benefits, allows him to reduce on-line connection time. In this article we focus on characteristics of telecommunications software that can significantly improve its educational use and illustrate our discussion with an example from the Netherlands.

## 2. COMMUNICATION SOFTWARE, AN IMPORTANT TOOL

Despite considerable interest, telecommunications use in the classroom is not yet widespread. The major trend has been the great enthusiasm for telecommunications-related educational activities, particularly computer-mediated communication, but certain serious problems consistently trouble telecommunications use in the educational setting [1,4,5]. Unless the so-called "first-level" problems, such as unavailable or unusable equipment, are solved, no telecommunications use occurs. However after these "first-level" problems, "second-level" problems arise. Effective use of telecommunications depends largely on the organizational insight of the teachers involved and the necessary skills for computer use in connection with telecommunications. Second-level problems are those which relate to these human and instrumentation issues.

Electronic communication and information systems differ greatly. Not only the technique, and the interface, but also the data-structure, the changing content, the way the content is organized, and the way in which the user can interact with the content, make it difficult for teachers to turn a telecommunications application into a useful educational tool. Given the fact that the teacher has limited influence on the market in which these systems operate, he is bound to work with the on-line sources available. However he can make a choice with respect to the software for data communication. There are many low-priced packages available that can be used on an average school computer. The packages differ as to the kind of options offered, the quality, and the user support. Also important to know is that most of these packages work only well with only one particular system, as for example a bulletin board system, and have never been developed for a classroom situation.

However, things are changing with regard to the on-line services themselves. The early databases, only meant to be used by specialists and trained personnel, are becoming obsolete. More sophisticated on-line systems are being developed with more user-friendly interfaces, but are still not open to the public. More recent developments show that the telecommunications market is moving towards a supply of more diversified on-line systems with communication options and information that fit the needs of a broad range of users. These public systems apply to the daily needs for information and communication of the average citizen. More and more of these general applications offer good opportunities for educational use [3]. What remains is that the user needs communication software that can conveniently handle more than one on-line system.

In general, however, very little attention has been paid to the development of communication software for educational use. To improve the accessibility of any on-line system it is wise to have as good a tool as possible on the user's side of the line that



allows teacher and student to use a system as economically as possible. For example in the United States some developments focus on the extension of the central intelligence of an on-line system with local intelligence incorporated into the communication software, but in Europe little attention has been given to this matter. Therefore it is valuable to take a closer look at the development and features of a "locally" based software product for data communication made in the Netherlands, under support from the Dutch PTT Telecom, and distributed to schools throughout the country. This package, Teleline (Telelijn, in Dutch) [6] is described next.

### 3. TELELINE, DEVELOPMENT AND FEATURES

Local intelligence in the form of a software package for data communication can help the teacher to circumvent the difficulties that arise in dealing with different on-line information and communication systems, to process on-line information in an economical way, and to organise classroom work more easily. It is also important that the package functions as an instrument with which the initial difficulties in trying to use telecommunication as an instructional tool can be overcome. It is not the technique, but the skills, information, and communication between users that makes the difference.

This knowledge was an important starting point for the development of Teleline. The package should help the teacher and students to:

- develop a basic understanding of the data communication process;
- access the most important (national) communication and information services;
- to use telecommunications in an educational setting through interesting didactical options.

The Teleline package consists of *Teleline*, the communication software, *Telesim*, the simulation software, and a teachers' guide.

The first version of the package was developed as a side-product for the *Computerjournaal*, a series of educational television programmes on informatics for the youths between the ages twelve and sixteen [7,8]. Because telecommunications are becoming more and more an integral part of the *Computerjournaal*, subscribers received help in using telecommunications by means of Teleline. Telecommunications were used not only in the teaching material, but also as a means of delivering additional instructional material and for communicating with the development team.

Because telecommunications, in general, is becoming more important in education, PTT Telecom, the initiator for the development of the package and partner in the *Computerjournaal* project, decided to have a regular update of the package and make it also available to non-subscribers of *Computerjournaal*. It has therefore commissioned an evaluation of the package (see section 5.1). Before indicating the results of the evaluation, the package will next be described.

## 4. MAIN FEATURES OF TELELINE

### 4.1. Teleline, Communication Software

Teleline works at best from the computer hard disk. After the program has been installed, the software has to be adapted to the hardware and the on-line system one wants to use. This can all be done from the main menu that appears as soon as the program has been activated. Figure 1 shows the main menu.

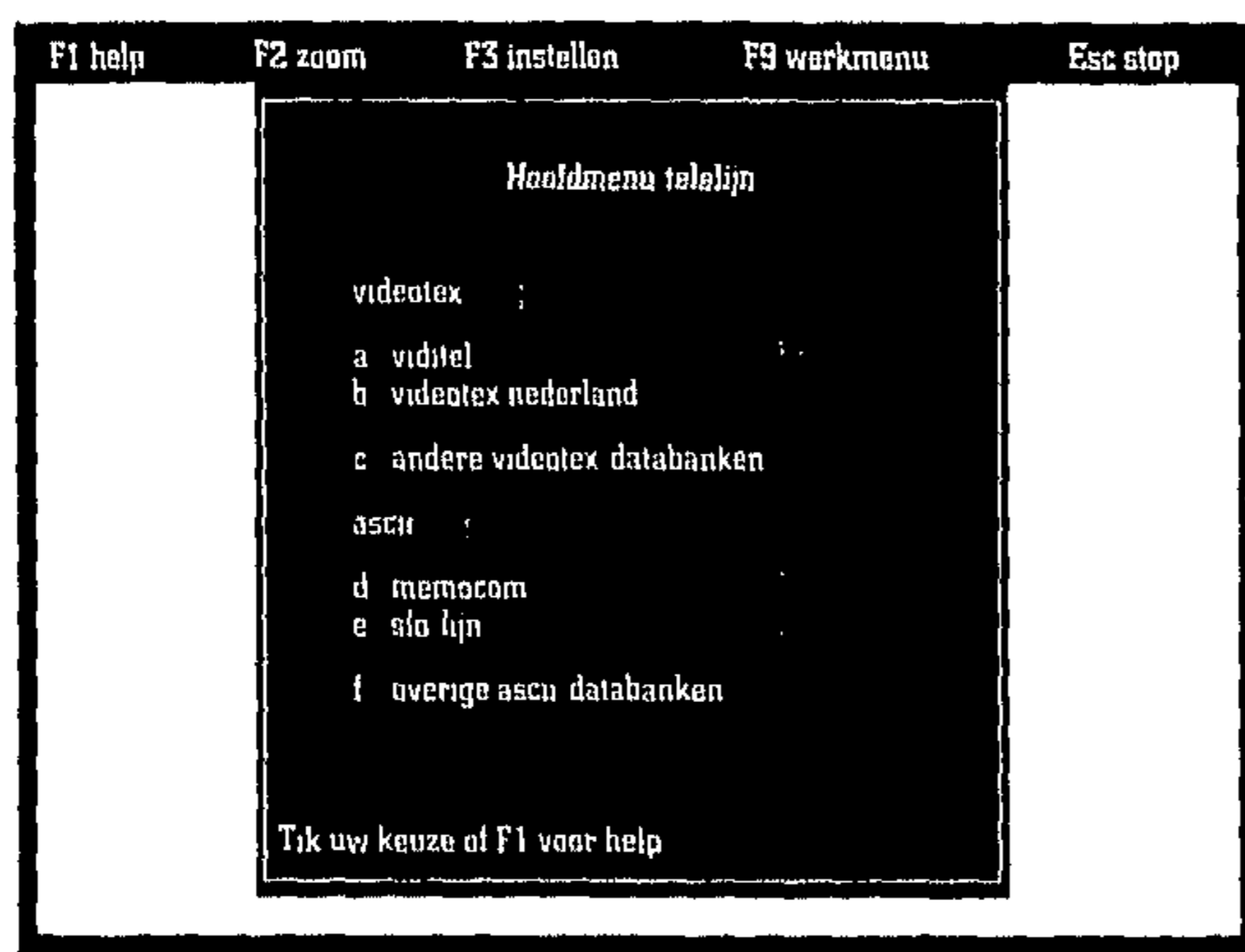


Figure 1. Teleline: Main Menu.

The main menu, as shown throughout the program, shows a selection bar at the top of the screen. By using the function keys one can activate several applications. Below the selection bar is a field with options for the choice of Videotex or ASCII-based on-line systems. Four choices have been preprogrammed and can be used immediately without changes in the program. These choices represent the four most frequently used systems for educational purposes in the Netherlands. Using key <c> or <f> the user gets an overview of other preprogrammed on-line communication and information services and has the opportunity to change, delete or add a service.

If the user is not familiar with the meaning of the word Videotex, he can push <g> and get more information about Videotex. This is an important feature that can be found throughout the whole program. Pushing <e> means that Teleline will start calling SLOlijn, a Bulletinboard system for Dutch teachers, sponsored by PTT Telecom. This is another phase in the communication process and another screen will appear.

In the selection bar "F2" is a zoom-option which allows the user to change the size of the screen (25, 43 or 50 lines) which can be helpful in case of a group demonstration. To accommodate the program to the individuals own hardware "F3" can be used. "F9" is the "werkmenu", a file-management system for the organization of downloaded or uploaded files and for information screens saved during an on-line or off-line situation. "Escape" means in any situation "one step back" or "stop the program".

The content of the selection bar changes with the phases, which means that, for example, in an on-line situation only the options relevant for this situation will be available.

Very useful, from organizational and didactical perspectives, are the so called "green pages". Every piece of information coming from an on-line source is stored in this green

area as soon as the user moves to the next part of the on-line information. It is like turning pages. This book metaphor allows the user to browse in an on- or off-line situation through the collected "pages" of information, to review his search path and decide whether to delete, print or save the information on disk. Figure 2 shows the split-screen approach used for the grey page and active page distinction.

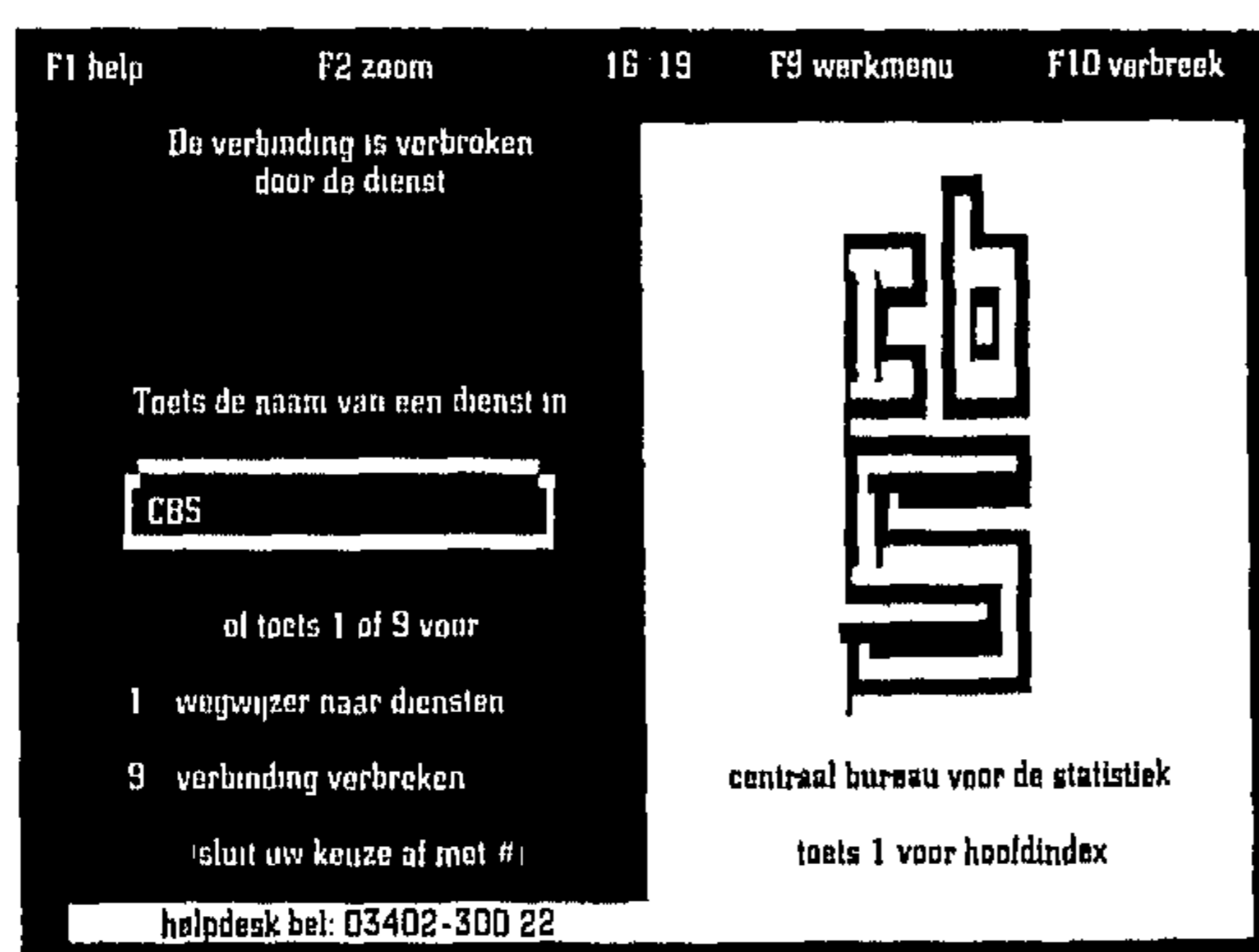


Figure 2. The use of the "grey pages": The on-line information is presented on the right side of the screen. The previous page of information has been moved to the "grey memory" and is still visible on the left.

This option for a remote selection of information is especially very useful in a classroom situation. It allows the students to browse quickly through the on-line information, and go off-line to select whatever is needed.

#### 4.2. Telesim, the simulation software

Telesim is an off-line simulation of the communication software Teleline. It reproduces the look and feel of the on-line use of the communication software, and adds instructional and reference features such as help and explanatory prompts. Telesim consists of two parts. The first part deals with "the look and feel" of Teleline. The second part is more or less a "guided tour with Teleline" that introduces the user not only to Teleline but also to two widely used on-line communication and information services in the Netherlands.

#### 4.3. Teachers' guide

The Teachers' guide is a booklet of 34 pages with information on:

- the starting points for the development of the package;
- installation of the package, the technical features and an outline of the structure of the program;
- how Teleline and Telesim work;
- how to use the package in an educational situation with some examples of classroom work;
- important on-line information and communication services.



Figure 3 shows a diagram from the teachers' guide, in which the structure of the data communication program Teleline is explained

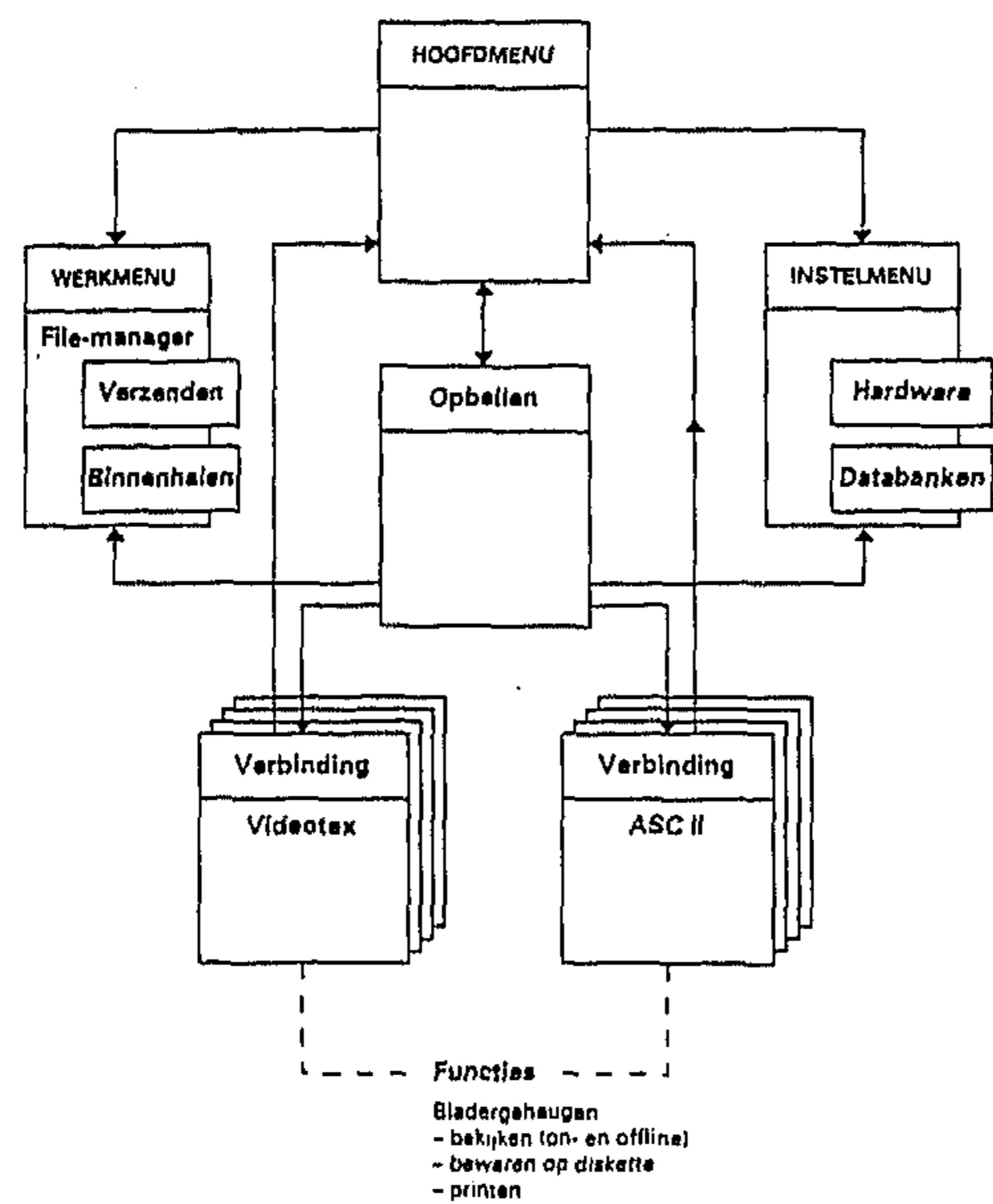


Figure 3. Teleline: Program structure.

Part of the Guide is a series of masters for transparencies of the most important screen situations, which can be helpful for teachers who have no datadisplay at their disposal. Last but not least is the glossary of terms used throughout the program.

## 5. IMPLICATIONS OF TELELINE FOR EDUCATIONAL COMMUNICATIONS SOFTWARE

### 5.1. Research results

We conducted a nation-wide evaluation of teachers' reactions to the Teleline package (Teleline communication software, Telesim off-line simulation software, and the accompanying Teachers' guide). A survey was executed, schools were visited, and teachers interviewed. Teachers were asked to comment on specific design aspects of the Teleline communications software, as well as their experiences with the management of Telesim and Teleline use in the school environment, the impressions of student experiences with the software, their opinions about the Teachers' guide, and their estimation of the educational value of the complete package. Results were submitted to the PTT Telecom, which commissioned the evaluation for use in a revision of the package [9].

Major results of the evaluation were:

- Despite having ordered the Teleline package, most teachers had not yet used it. Most frequently, teachers lacked access to a computer system convenient to a telephone connection. Schools often did not have a modem, and the fact that school computers are often only located in a networked computer laboratory makes it additionally difficult for teachers to use one computer for telecommunications activities.
- Despite these situational frustrations, most teachers indicated that they intend to eventually integrate telecommunications into their teaching activities.
- The teachers appreciated having Dutch-language software materials.
- With respect to the Teleline data communications software, the teachers appreciated the "grey pages" feature, which allows off-line storage of all on-screen activity. This not only minimizes on-line time, but more important educationally, allows the teacher and student to reflect on and select from the contents of an on-line session after they have considered the contents as a whole and without the pressure of being on-line. The feature also is an easy way to give teachers a record of what students did while on-line.
- Teachers appreciated the idea of an off-line simulation package, but did not make use of it as a learning experience in itself if they did not have the opportunity to follow it up with actual on-line experiences. Using it as a demonstration resource for whole-class discussion was never considered.
- Many constructive suggestions were made, particularly about increasing the scope of the simulation software, adding student-management options, and improving the installation options on the data communications software.
- Teachers appreciated the teachers' guide, but wanted to also have lesson suggestions and ideas for management of telecommunications use in the class setting.
- The different experience levels of the teachers indicated the value of offering separate levels in the data communications software for new users and experienced users.
- Installation options that recognize the fact that most school computers are only available in networked labs need to be included.

In addition, previous research studies completed this year [10,11,8] have also focused on improving the Teleline package. Soepboer's research involved observations of students during use of the Teleline and Telesim programs, followed by a detailed evaluation and redesign of Telesim to improve its educational effectiveness. The prototype of this new version is now being evaluated. Instructional design considerations based on increasing the educational value of Telesim guided each decision in the redesign process [11].

Instead of focusing on the software itself, Verwijs [8] concentrated on increasing the impact of the support materials available with Teleline as a strategy for improving the implementation of the package in the classroom setting. She analyzed and redesigned a teacher's guide and developed a videotape so that teachers can see not only a demonstration of the use of the Teleline communications software, but also various examples of the management of student use of the software in different classroom situations.

## **5.2. Conclusions and recommendations**

What aspects of the Dutch Teleline experience are relevant to educational telecommunications use more generally? We present our conclusions in three categories: relative to the communications software itself, to the broader set of instrumentation for educational telecommunications use, and finally to all the agents involved in the educational application of on-line communications and information services.

### **5.3. Recommendations for the design of communication software for educational use**

- The software should help the teacher and student to develop a basic understanding of the data communication process.
- The technical features of the software should allow the user to have access to all important (national) on-line communication and information systems.
- The package should contain options for using the on-line connection time as economically as possible through on-line and off-line mechanisms for communication and the selection of information.

### **5.4. Recommendations for supporting instrumentation for data communications software**

- Provide an off-line simulation of the communication software, reproducing the look and feel of the on-line use of the communication software, but adding instructional and reference features such as help, explanatory prompts, and a "guided route" through an exploration session with simulation software (see also [12] for research on these features in the context of another research project supervised by the authors. This project focused on an off-line simulation of a communications system for the deaf).
- Organize an accompanying teachers' guide for the communications software, which includes specific attention to managing student use of the software and which anticipates predictable questions and problems teachers may have in using the software with locally available on-line systems. [13,4].
- Provide a videotape (or use a television broadcast - see the Dutch "Computerjournaal" project [7,8], for an example involving Teleline) that shows the process of communications software use, in order to help users anticipate screen-displayed choices and to help users discriminate between the communication software environment and the environment of the on-line service to which they are connected. This distinction is often not made, by teachers and students alike [10].

### **5.5. General recommendations for educational telecommunications use**

- Providers of on-line communication and information services should offer easy-to-use and marginally (or free) access to exploratory subsets of their services, so that teachers can familiarize themselves with the organization and syntax of the service, as well as decide on its educational value to them, before fully subscribing and learning to manipulate the full range of possibilities of the on-line service [1].
- PTT should work together with instructional resource developers to provide teachers with, preferably free, packages such as Teleline, containing communications software explicitly designed for education, simulation software, teachers' materials and, perhaps, an implementation-oriented videotape [4,13].



- The Ministry should develop educational policies that support innovative teachers in their investigation of on-line communications and information services and involve these teachers in the design of support instrumentation for such services [14].

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