




The World Wide Web: introduction and first orientation on personal use

Since the introduction of micro-computers in education there have been continuous discussions about the educational value of ICT and the ways computers could be used so that they add value to the educational process. Since the introduction of Internet the overarching philosophy has been that our societies are changing from industrial to information societies. This chapter will review a number of reasons for introducing the WWW in education

This manual offers an introduction to the use of WWW in education. First some information is provided about the Web as human knowledge base. This is followed by a description of several types of Web based learning.¹ Via practical exercises the users of this manual can orient themselves on what the Web can offer for personal use.

ICON KEY

- | | |
|---|-----------------------|
|  | Information |
|  | Practical exercise |
|  | Reflection/Evaluation |

The icons that are shown at the left will be used throughout this manual in order to indicate the type of material that will be described. Each chapter will contain information about the chapter topic, a few practical exercises and a section about reflection and evaluation.

¹ Many parts of the text in this chapter have been extracted from Thijs et al. (2001) and Voogt & Odenthal (1997)

The Web as human knowledge base



The World Wide Web can be considered as an enormous depository in which ultimately most of the human knowledge will be stored. Nowadays it is already the case that for an almost unthinkable amount of questions answers can be found on the Web. All kind of information varying from consumer matters (finances, travel, hobbies, shopping, etc.) to history, medicines, and scientific disciplines can in principle be accessed by almost everyone. This digital world of human knowledge is due to its sheer size also a jungle in which one can easily loose track. Therefore it is necessary that citizens become acquainted with this jungle in order to find their way to appropriate materials.

The Web offers many possibilities for supporting teaching and learning processes (cf. Kahn, 1996). Besides enriching more traditional pedagogy, the Web also has many potentials to support the implementation of innovative teaching and learning processes (Web-based education commission, 2000). These potentials are discussed in this section.

Firstly, the Web provides access to a vast amount of current subject matter content and information. These so-called cyber libraries differ from normal libraries in terms of scale, variety, and communication possibilities (Collis, 1998). Materials are provided in a variety of formats, such as text, images, sound, and animation. This amount of varied information provides a sound basis for the creation of learning environments in which students can engage in creative inquiry-based learning processes with an emphasis on developing problem-solving skills. By offering simulations and visualization tools scientific phenomena can be explored and theory can be illustrated. By providing access to resources used by scientists, scholars, and historians, cyber libraries open the door to exploring authentic issues and contexts (Web-based education commission, 2000). By being exposed to the large amount of information, students are allowed to develop their capabilities as a 'knowledge manager' (McGhee & Kozma, 2001). Students can learn how to find and access information and how to evaluate the relevance and quality of the information found. Also, compiling, managing, analyzing and synthesizing information is a skill that can be exercised. This information retrieval can be part of a guided reflective research project, in which students investigate real-life problems or issues. Such projects offer students opportunities to develop research skills, such as problem identification and analysis, developing a plan for data collection (information search), analyzing information, and drawing conclusions. The Web also allows students to work with real-life research projects, resources and tools that may not be available in schools (Web-based education commission, 2000). Students can, for example, conduct experiments in a virtual laboratory provided by the NASA. The Web thus has the potential to provide a rich environment for students to retrieve and use

current information sources, and to apply research skills for solving authentic problems.

Secondly, the Web also offers a variety of possibilities for communication and creating networks of people. Electronic mail, or e-mail is the most familiar way of transmitting electronic messages. When e-mail is addressed to a list server, it is automatically broadcasted to everyone who subscribes to the list. Besides email (which is a asynchronous way of communication), chat tools allow for direct online synchronous communication. Another way of communication is via newsgroups which are available on the Web for a multitude of topics. Anyone who installs a newsreader and connects to a news server can view and post messages to a newsgroup. Still another form of communication is via a forum, which is an online discussion group in which participants with common interests can exchange open messages.

These communication tools give students a chance to develop their social interaction and communication skills (McGhee & Kozma, 2001). Students can participate in electronic pen pal or global classroom projects. Participation in such projects allows students to develop their literacy skills and adds to their cultural and global awareness. By participating in joint research projects with other schools, so called collaboratories, students also learn to collaborate and work as part of a team and consequently develop skills which are required for successful cooperation in teams.

Thirdly, the Web also offers powerful opportunities for students to present information and share products with others. The possibility to add and share ideas through the Web in a simple way is supposed to enhance knowledge creation of students in new ways. Students can produce their own websites and present their products at existing websites. This way they can learn how to communicate using a variety of formats. Publishing on the Web opens the door to a potentially large audience, and provides opportunities for instructive dialogues between the authors and the audience. Through peer review processes, students can learn how to provide feedback and learn from the feedback provided by their peers.

Finally, the Web offers possibilities for new forms of student assessment (Alessi & Trollip, 2001). The Web provides good possibilities for developing electronic portfolios. In such portfolios students can collect and document a variety of materials (text, photographs, audio, video) for monitoring and documenting their learning progress. Furthermore, Web-based tests can include items, which are adapted to individual students' performance. As a Web-based resource, such tests offer good possibilities for automatic scoring, data-storage and analysis. The information on student performance can be made available online for direct access to teachers, which makes it possible for teachers to adapt their teaching accordingly. However, while the use of Web-based testing is growing in the military and training fields, the use in education is still limited (Web-based Education Commission, 2000).

Types of Web based learning

In the following five types of Web based learning are shortly described. These text fragments are derived from a document called Web based learning which was written by Thijs, Almekinders, Blijleven, Pelgrum & Voogt in 2001. The full document is available at *****. The five types of Web based learning that are distinguished in this document are:

- **Web referral**
- **Web quest**
- **Web exploration**
- **E-mail project**
- **Collaboratory**

Web referral

Web-referrals are Web sites, used as additional Web-based information sources for a traditional classroom activity, where a teacher can refer to.

The use of Web-referrals can be conceived as the most basic form of Web use. This type of Web-based learning is used as an extension of a normal, traditional classroom lesson. So, instead of using additional reading, use of media, etcetera, the teacher refers to a few Web sites, which the students have to consult. Because of the wide possibilities of the Web, the web-referrals may have different representation forms and can be used for different learning goals (e.g. use of text, dictionaries, encyclopaedias, video, simulations, et cetera). This type of Web use is almost totally controlled by the teacher, because the teacher decides which sites the students have to visit. The teacher can do this in front of the class. There are not much pitfalls envisaged with regard to using Web-referrals in an educational setting. But, due to the continuous change of the web, it is advisable for teachers to always have extra Web-references available, because it happens too often that Web-sites disappear or get another address (Alessi & Trollip, 2001).

Web quest

A Web Quest is an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet, optionally supplemented with videoconferencing. There are at least two levels of Web Quests that should be distinguished, namely 'short term' and 'long term' Web Quests.

'Short term' Web Quests are designed to be completed between one and three class sessions. The instructional goal of 'short term' Web Quests is knowledge acquisition and knowledge integration. During Web Quest-performance the

learner struggles with a considerable amount of new information that in a limited time must make sense to this learner. 'Long term' Web Quests are designed to be completed between one week and a month. The instructional goal of these types of Web Quests are extending and refining knowledge. During Web Quest-performance a learner analyses a corpus of knowledge deeply and tries to transform it in some way. Finally the learner has to demonstrate that he or she understands the information by creating something to which others can respond. In general, for a teacher there are two ways to work with WebQuests, namely (1) using an existing WebQuest or (2) design your own WebQuest. When a teacher decides to use an existing WebQuest, he or she can use for example the WebQuests presented at the San Diego State University WebQuest web-site².

If a teacher wants to design a WebQuest, it is important that he or she considers the most important attributes a WebQuest must consist of. According to Dodge (1997) a well designed WebQuest (both short term and long term) is deliberately designed to make the best use of a learner's time. He argues that there is no educational benefit in learners surfing the Internet without a clear task in mind. Above all, designing a WebQuest is basically not much different from designing any kind of lesson. Within each WebQuest it is important that learners have time to get oriented, can carry out feasible tasks, have the resources and guidance at their disposal they need to complete the task, have information about the way the task will be evaluated and finally after carrying out the tasks, the learners get a summary and extension of the WebQuest. To achieve efficiency and clarity of purpose, Dodge (1997) describes six critical attributes, that should be part of each WebQuest, these are:

1. An *introduction* that sets the stage and provides some background information.
2. A *task* that is doable and interesting.
3. A set of *information sources* needed to complete the task.
4. A description of the *process* the learners should go through in accomplishing the task. The process should be specified into clearly described steps.
5. Some *guidance* on how to organise the information acquired.
6. A *conclusion* that brings closure to the quest, reminds the learners about what they've learned, and perhaps encourages them to extend the experience into other domains.

Next to the six critical attributes, Dodge (1997) mentioned also three non-critical attributes. First, WebQuests can be carried out by individual students, but by far most WebQuests are *group activities*. Next, Dodge advises, that it is a good idea to enhance WebQuests by means of wrapping motivational elements (like role

² URL examples WebQuest: <http://edweb.sdsu.edu/webquest/matrix.html>

playing) around the basic structure of a WebQuest. Third, WebQuests can be designed for a *single discipline* (or content area), but also for *interdisciplinary instruction*.

With regards to the competencies, a student need to carry out a WebQuest, he or she must have the basic competencies, required to use a computer and to handle an Internet Browser. Based on the fact that the majority of the WebQuest are group activities, a student must also possess competencies, related to collaboration (e.g. active listening, showing respect, et cetera).

The amount and type of materials needed, to carry out a WebQuest depends on the nature of the WebQuests. Next to basic materials like computers, paper and pencil, one WebQuest requires only a computer and a few URL's, while the other WebQuest is much more extended, and to carry out this WebQuest, the students need for example materials to make some calculations (e.g. ruler or a setsquare).

In this section the most important characteristics of a WebQuest have been described. For additional information the web-site of the San Diego State University can be consulted. Amongst others, this web-site contains:

(1) information about how to design a WebQuest, (2) examples of WebQuests, (3) information about how to evaluate a WebQuest and (4) information about how to search the internet.

Web exploration

The term *web exploration* in an educational context refers to assignments that ask the student to find and use information on the Web about a particular topic. The assignment also describes the type of results at which the students has to arrive. On the Web the term *web exploration* is not exclusively used in an educational context. Anyone, in any context, can do a web exploration. In other words, anyone who has access to Internet can (and sooner or later will) explore the Web. Phrased like this a web exploration is almost identical to a *web search* where an individual searches the Web for information resources about a topic of his or her interest. A web exploration also has some similarity to a WebQuest but the difference is that in the case of a web exploration focus is also on learning to search for information.

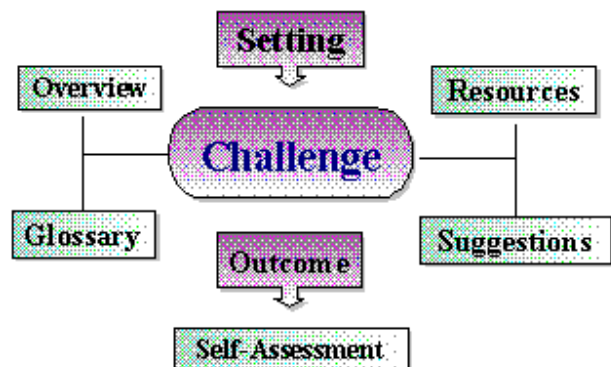
To help students to get started a web exploration assignment can contain a list of links that act as a starting point for the exploration. However, during the exploration the students can follow hyperlinks or use search engines to find additional information on websites that are not mentioned in the assignment. Defined like this we may also speak of a *guided web exploration* (GWE).

The major components of a GWE are:

- Scenario or hypothetical setting with which the learner can identify

- Challenge:** the learner is asked to create solutions to posed problems, this part consists of:

- An overview of the challenge
- Links to information resources that are accessible via the Internet



- Suggestions for plan of action, critical thinking and problem-solving
- A glossary providing definitions of terms
- Learning outcome in the form of a product
- Opportunity for reflection and self-assessment of the learning experience

To prepare for a Web exploration, an instructor needs at least to formulate an assignment stating what has to be explored, and providing some starting points for the exploration. In the case of the second example more preparation is required. As has been indicated it is possible to make use of the software that has been developed for making this type of Web Explorations. If one wants to go this way, it is necessary to obtain that software, design an assignment, write an itinerary, and build an exploration with use of the available software. To be able to perform any kind of Web Exploration, students need to be able to use computers that are linked to the Internet (or to a local mirror). Students also need to be able to report their findings in some form or another. Mostly reporting will take the form of a written report.

In the case of a more open-ended web exploration students also need to know what kind of information they are looking for, they need to be able to search this information on the web through making use of search engines, and they need to be able to evaluate the quality of the information that is found.

E-mail project

In e-mail projects students communicate with other students on certain topics by means of email. Such tele-collaboration projects are often referred to as *e-pals* (electronic penpals) or *keypals* projects, when students communicate with other students individually or in small groups, or *global classrooms* when a class as a whole communicates with another class. Communication can take place with another class within the same school, with a class in another school, or with school in another country.

What can students learn from such projects? In general e-mail projects can enhance students' social interaction and *communication skills*. Students tend to speak more freely in e-mail communication than in face-to-face conversations (Beach and Lundell, 1998). E-mail projects can also facilitate and enhance in-class discussions (Collins, 1997). By providing authentic contexts for reading and writing, e-mail projects can contribute to students' *literacy skills*. E-mail discussions with peers allow students to use language in meaningful and authentic ways. Riel (1989) showed that when students write for a real and interested audience, they are more motivated to write and enjoy writing more. Moreover, they are more careful about their language use, state their ideas more clearly, and the content of their writing is more substantive. E-mail interaction can also be effective in enhancing students' literacy skills in a foreign language. By communicating in the target language, e.g. English, students can improve their fluency, enlarge their vocabulary, and enhance their reading and writing skills. Furthermore, if students with different cultural backgrounds are involved, email projects can contribute to students' *cultural* and *global awareness* (understanding). By involving schools in other countries or regions, students can broaden their perspectives and expand their understanding of other cultures and environments (Tao & Reinking, 2000; Garner & Gillingham, 1998). Finally, e-mail projects contribute to students' *technological literacy* by allowing them to learn how to use e-mail and other electronic communication tools. As possibilities for electronic communication are increasingly used, knowing how to use e-mail is an important skill in the current society.

E-mail literacy projects can take place with different age levels and levels of proficiency in students' mother tongue or a foreign language.

A first step in starting an email project is to establishing contact with a partner class or school. It is important is to find partners that are committed to similar project goals and include students with comparable proficiency levels (Meloni, 1998). If it is difficult to find schools or classes that would be interested to participate, teachers could join existing networks, such as the I*EARN project (www.iearn.org), a network of over 3000 schools in more than 90 countries. There are a variety of Websites with names of students and classes looking for keypals and joint email projects, see for example ePALS (www.epals.com) www.scoe.otan.dni.us/webfarm/emailproject. Another possibility is to organize an email project can also be organized within the school. For example, students from different classes can correspond with each other, or even students within class. Teachers can divide their students into groups for email communication, e.g. sending each other comments on a book they have just read in class. Although this may seem artificial, such email projects have proven to be effective in enhancing students' reading and writing skills (Meloni, 2000).

Email projects can focus on many different topics. As children generally write better about things they know well, it is best is to start with a topic they are

familiar with. Moreover, it is advisable to include topics on which students can gather information locally and add local examples. This will enable student to learn more about their local environment and how it differs from other places and thus contribute to their global awareness.

A next step is to decide on the type of interaction with your email partner class or school. Students can be paired to individual students in the partner class or messages can be send by a class as a whole. The project can involve informal exchange between students on certain topics, or students can send each other stories or reports of a short research studies into issues in their local environment. Another possibility is to ask students to exchange articles or position papers on certain issues (see example of the Webmagazine), or to contribute to discussion forums on the Web (see example of the UNICEF discussion website). In addition to text, pictures, photo's, drawings can also be exchanged.

Finally, it should be clear how the outcomes of the email interaction will be published. A printed booklet could be made of the different stories and reports that have been exchanged, or students' results can be published on a joint Web page or as part of the Webmagazine.

A good introduction to the partner class is essential for successful implementation of email projects. Students will be more motivated to participate if they personally know their keypals. To make their virtual friends real, students can introduce themselves by sending personal information through email, and photographs of the partner class can be displayed in the classroom. If schools in another country are involved, Teachers could provide information about the country and culture, and students can prepare an information package about their own country and school. The partner schools' location could also be marked on a world map and teachers could mount two more clocks on the wall to display the local time in your the school. Throughout the project, other friend-making activities could possibly be organized such as a videoconference, or if schools are within the same region, a joint field trip.

During the implementation of an email project, it is important to provide plenty of in-class learning experiences around the curricular topic that is addressed. This will enhance the project's integration in the curriculum, e.g. as part of language learning or world studies, and will contribute to students' motivation to participate³. For example, a storytelling project can start with a whole class

³ For example, the Teachers guide to international collaboration. See:
<http://www.ed.gov/technology/guide/international>

discussion of the assignment and can be part of several lessons on story writing. An informal exchange project, e.g. the Teddy bear project described above, can be accompanied by in-classroom discussions. A discussion project, in which students discuss global issues, can be preceded by small research projects or jointly gathering information on the issues addressed. The email communication should not be an end in itself, but should be part of other learning activities in the classroom.

Collaboratory

In 1989, William Wulf, then an assistant director for a division of the U.S. National Science Foundation, defined a collaboratory as "a center without walls, in which the nation's researchers can perform their research without regard to geographical location, interacting with colleagues, accessing instrumentation, sharing data and computational resources, [and] accessing information in digital libraries." a later definition is "[an] integrated, tool-oriented computing and communication system" (Cerf et al., 1993). The term collaboratory is as yet not used in an educational context. It primarily refers to what 'real' researchers do and not to what students do. A collaboratory can take on many forms. What is common is that it makes use of the Internet for creating the "center without walls" that was first mentioned by William Wulf. Tools that are used in a collaboratory are those that are described in CSCW literature. For example, videoconferencing, electronic whiteboards, chat, and so on. In most schools the technical infrastructure is not yet suited for this kind of tools. Nevertheless, there are more and more examples available of educational websites that may best be described as collaboratories. In the context of WBL at secondary education level we therefore define a *collaboratory* as a website through which students (and their teachers) form a team that collaboratively works on an investigation as part of an often larger research project. The use of remotely located instrumentation, shared data, and various forms of communication.

The word collaboratory is sometimes also used to describe a classroom that is built and arranged to promote student-centered learning or for a classroom that contains a computer network through which students can work on one task in a collaborative manner. In all cases the word collaboratory seems however to be used to describe an environment, be it real or virtual, that is intended to promote learning through inquiry and facilitate collaboration and sharing of resources.

An obvious first step is to find a website that fits in the curriculum and that can be used as a collaboratory.

Once a website has been identified the teacher can plan how it is going to be used, or at least introduce one possible way of using it and let the students take off from that point. Associated with this is that probably some learning goals have to be set that make it worthwhile to use this kind of WBL in a specific context.

Orient yourself



Before starting to use the Web in education it is important for teachers to orient themselves on the possibilities of the Web and to get acquainted with this new environment. A good way to start is to first explore what the Web may mean for each individual personally. Below are a number of exercises and tips for exploring the potential of the Web for personal matters.

Personal value

The Web can only mean something for you as professional if you also personally value its use.

Ask yourself a number of questions that are important in your personal life, for instance: how can I find out about the departure times of trains, which information is available about the animals in which I am interested, what is known about a particular medicine that I or family members are using, can I see a picture of the Mona Lisa in the Louvre museum?

Start your Internet browser and connect to a search engine (for instance www.google.com). (The Netherlands: www.startpagina.nl ; Western European Countries: www.linksummary.com ; Bulgaria: ***** Poland: *****--**every country can add their best portals in the translated version**). If you do not know how to start an Internet browser or how to connect to a search engine or portal, ask you instructor or a colleague.

If you use a search engine, type for instance in the search menu 'picture of the Mona Lisa' and you certainly will find some pictures. Try in this way to answer a number of questions that are of personal interest to you. Our advice is that you try to do this in English as well as your own national language. In this way you will learn which information is available in your own language and this is of course also important to consider when later you will try to find how your pupils can use the Web, most of whom probably are not very fluent in English language. If you use a portal: try to find a 'link' to a website, which leads you to the information

Your experiences

Keeping track of experiences in doing personal orientations will help you to determine what the Web can mean for pupils.

While doing these exercises keep track of the following: how long do you need to wait when connecting to a particular site, can you easily find answers to your questions, what is the difference between a search engine and a portal, for what kind of information would you advise teachers to start to search at a portal and for what kind of information would you teachers advise to start to search at a search engine, which problems did you encounter, did you have to read a lot before you found the answer(s) to your questions(s), which particular questions may be

interesting to show to your students, if you find an interesting place to visit on the Web how can you save the address for later use?

Finally share your experiences with other teachers who did the same type of exercises and discuss together with your instructor and the other teachers which common problems occurred and how these might be solved.

Once you have done the exercises that are mentioned above, a next step will be that you need to exercise how to share the information with others. The next set of exercises is meant to practice how you can do this in a digital way.

Take one of the questions that you were able to successfully answer. Open on your computer a word processing program and write a few sentences to explain your question (why did you pose the question?, pay attention to clearly wording the question), also open the Internet browser and connect to the site(s) that contain the answer(s). Next copy text and pictures from the browser window to the Word processor. If you do not know how to do this you may ask a colleague or search the Internet for help (for instance type in the Google search window 'how to copy from a browser window to a word processor' or go to http://www.a7designs.com/internet_help.htm where you find information on how to do this. Once you have done this, save the word-file to your hard disk or a diskette.

Next there are a couple of possibilities to share the information with others. Of course you can print it and give the print to another person. However, in some cases this may be difficult if you do not have a color printer or if you consider the costs of printing in color a burden. You also can send/give the diskette with the word file on it to another person. However, the easiest, quickest and cheapest way is to send the file via e-mail to the other person. This, of course, is only possible if that person has an e-mail address and is regularly checking his or her e-mail.

Make yourself acquainted with sending files via e-mail to other persons and also exercise yourself how to handle e-mails from others who have sent you a text file. If you do not know how to do this, ask a colleague or search on the Internet for help. While doing this try to repeat a couple of times the following actions: save files that you received to a directory on the hard disk, forward a mail that you received from someone to another person that you know, view the file without first saving it to the hard disk. Make sure that (analogous to archiving materials in the traditional way) that you create folders in such a way that it is easy to retrieve the materials later.

Reflection



Finalize the exercises above by answering the reflection-questions about ‘Orientation fase’ that were given to you at the start of this session. Important note for organizers of the training session: make sure that each participant receives a (temporary) e-mail address and check before the meeting if the addresses are correct. Make sure that the participants answer questions about the proceeding of each phase in this training session. The information that is collected in this way will be used for the evaluation

Reflection

Reflection and sharing your experiences with colleagues will help to strengthen your confidence about the ideas that you are developing. It is a form of reality-testing.

part of the final report of this project and will be important to develop plans for a continuation of the project in the forthcoming years.