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Abstract: This document gives recommendations on all the quality aspects that are regarded as important in the ETB-network. On the one hand it focuses on the **documentation system**. On the other hand the focus of ETB is quality of **content of the web-based learning resources**. The ETB-project **gives recommendations and guidelines** to the repositories that join the network.
Keyword List: quality assessment, web-based learning resources, evaluation, re-usability,

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Part II

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0. INTRODUCTION TO EUROPEAN TREASURY BROWSER

- ETB links together existing educational repositories
- ETB is an entry point to educational resources on the Web
- ETB is multilingual
- ETB has a simple search interface, thesaurus browse and free text search
- Free for everybody

European Treasury Browser brings existing web-based educational resources within reach of the teachers and pupils. Educational repositories, i.e. servers holding educational resources, can join the ETB-network to build a European-wide collection of their favorite educational material.

For European educational repositories ETB means that their local users will have access to more material from different European educational sources in their own interest fields while still being assured of quality of the resources.

Other major asset of ETB is the possibility to search through all the resources submitted into ETB-network. This will happen through so called EUN native repository. It will have an easy-to-use multilingual interface supporting different ways to search. You can find educational material in all different languages and make queries in seven ETB-languages, which are English, French, German, Italian, Spanish, Swedish and Danish.

For all the teachers, students and other interested users it will be possible to submit educational resources to the network through the interface of EUN native repository. This way everybody can participate in building the European Treasury of best practice educational material together.

0.1 QUALITY IN EUROPEAN TREASURY BROWSER

ETB aims to represent a European documentation system, where the actors use documentary standards (see the whole ETB datamodel[1]), selection criteria and quality assurance procedures that are common to the system and established in advance.

Submission of web-based learning resources to ETB-network is based on the policy that all the records have to pass a local quality assessment before being submitted to the network. This is in the responsibility of each member repository and highly emphasised by the ETB when member is joining the network. This allows ETB to state

[1] http://www.en.eun.org/eun.org2/goto.cfm?did= 5874

that a repository becoming a member of the ETB-network already indicates that resources are of a good quality.

Secondly, the repositories shall make their quality assurance policy and quality assessment procedures available for everybody on the Web. This allows users to evaluate weather the quality assessment policy of learning resources meets their demands whilst assure them about the material found through the ETB. These two requirements create the base principal for 'Trusted sources' in the ETB-network.

The development of a formal selection policy for ETB:

- helps user to appreciate that the service is selective and quality controlled;
- helps users to understand the level of quality of information they will find when using the service;
- ensures consistency in collections that are developed by distributed team.

For this aspect repository managers, curators and administrators of an educational repositories (from hereon referred only as "repository managers"), the ones who are restrictedly allowed to submit metadata records to the ETB-network, represent a key role for maintaining the quality of resources high in ETB-network.

Firstly, the purpose of this deliverable is to provide information for repository managers about the quality of resources that will be included in the ETB-network. The repository manger is the bridge between the single resources of his collection and the ETB collection.

Secondly, this deliverable will give practical guidelines for teachers on how to improve teaching and learning by using web-based learning resources in classrooms and how to achieve more effective and efficient way of using them.

1 QUALITY ASSESMENT AND WEB-BASED LEARNING RESOURCES IN ETB

When people talk about quality in education they often think they are referring to the same thing, although people usually have very different perceptions about what quality actually is. Quality as such is a relative and subjective concept; different groups focus on different interests. Quality is best defined through target groups, which in the educational field means students, teachers, parents, school authorities, and the whole society.

What does quality assurance and quality assessment in education stand for? It has been said: "The business of education is learning. Quality of education means to support learning."[2] Another tentative answer could be "doing the right thing and doing it right" i.e. efficiency and effectiveness.

Does quality need standards? Quality being such a slippery term, it is useful to have common ground on which to talk. It is even more important to establish the criteria and goals against which quality is evaluated.

There are two main quality tendencies in the field of education. One is based on the international model of ISO 9000[3] (and 2000 version) quality management standards. They ensure the steps taken in the process of design and production meet the regulatory requirements of customers. There are efforts to put this also in the use of Learning Technologies, mainly when reassuring the end products. This is initiated by the European Standardisation body of CEN/ISSS[4], of which EUN is also a member.

The other tendency relies on an approach based on projects like DESIRE[5] and initiatives like GEM[6]. DESIRE focused on enabling access to high quality Internet resources in the context of subject gateways. GEM stands for Gateway to Educational Material and it is an American initiative. They both have worked on quality assurance regarding web-based learning material. The approach of the European Treasury Browser is established along the same lines.

To avoid over simplifying the educational context and its complexity, and to preserve the cultural diversity of the European web-based learning resources, ETB attempts to build its quality assurance in a flexible way. On the one hand it focuses on the **documentation system**. On the other hand the focus of ETB is quality of **content**.

[2] Source unknown, form a presentation of Britta Giertz, Uppsala University.

[3] http://www.iso.org

[4] http://www.cenorm.be/isss/Workshop/lt/

[5] http://www.desire.org/

[6] http://www.geminfo.org/

The ETB-project **gives recommendations and guidelines** to the repositories that join the network. The following deliverable illustrates these recommendations on two levels: repositories and teachers.

1.1 ETB DOCUMENTATION SYSTEM AS QUALITY ASSURANCE

ETB-network will have participants from local, national and European wide repositories of educational material in different subject areas. ETB offers users the possibility to search multilingual, classified, high quality educational material within all the partner repositories of the network.

ETB aims to represent a European **documentation system**, where the participants use **documentary standards** (ETB datamodel[7]), harmonised **Thesaurus**[8] vocabulary, **selection** criteria, and **quality assurance procedures**, which are common to the system and established in advance.

These following requirements create the base principal for **'Trusted sources'** in the ETB-network.

1. Member repositories submit only the **metadata records** of web-based learning resources to the ETB-network; the resource itself resides on the local server. ETB will provide a tool to help the submission of metadata records. This harmonises the collection of the data which will follow the ETB **datamodel**.

2. The **subject keywords** are added to the records at the submission stage from the **ETB Thesaurus**. This allows a multilingual search and also the browsing through the Thesaurus-interface to find resources. List of controlled vocabularies are also used, for details see Deliverable 4.2 or ETB website[9].

3. The submission of the metadata records is based on the policy that all the records have to pass **a local quality assessment** before being submitted to the network. This is in the responsibility of each member repository and highly emphasised by the ETB when a member is joining the network. This allows ETB to state that a member repository of the ETB-network already indicates that resources are of a good quality.

4. Repositories shall make their **quality assurance policy and quality assessment procedures available** for everybody on the Web. This allows users to evaluate weather the quality assessment policy of learning resources meets their demands whilst assure them about the material found through the ETB-

[7] http://www.en.eun.org/eun.org2/goto.cfm?did= 5874

[8] http://www.eun.org/eun.org2/eun/en/etb/sub_area.cfm?sa=440

[9] http://www.en.eun.org/eun.org2/goto.cfm?did= 10949

network.

5. **Quality Selection Policy** When a repository joins the ETB-network, they are asked to state their Quality Selection Policy. For the reasons of unified responses, a controlled list has been prepared. This information will be provided in the metadata (namely in Collection Level Descriptors[10]). The label is named "**Quality Selection Policy**", namespace ETB CLD, defining the collection policy associated with the collection.

1.2 COLLECTION LEVEL DESCRIPTORS: QUALITY SELECTION POLICY

Collection Level Descriptors[11] is metadata to identify the entire collection of resources. A well-defined descriptions of the network's collections is done once, this reveals information about the existence, subject areas and availability of the collection to users in a standardised manner by using a structured machine-readable format. It also includes information about the Quality Selection Policy that the repository uses to assure the quality.

If a repository has established a Quality Selection Policy that is inline with ETB recommendations, the repository is able to start posting their educational records to the ETB-network without any further filtering.

If a repository doesn't have a sufficient Quality Selection Policy of their own, they are invited to adopt ETB Recommendations (see 1.3). In this case the repository can apply ETB- recommendations to check their learning resources. These recommendations are not exhaustive, but provide a scheme for the selection of material for ETB. In case the repository manager's competencies are insufficient to allow for a reliable application of the recommendations, again a team of competent teachers and/or domain experts can be involved to support this process.

[10] http://www.en.eun.org/eun.org2/goto.cfm?did= 3829

[11] More information about the Collection Level Descriptors on the ETB website at http://www.en.eun.org/eun.org2/goto.cfm?did=3829

1.2.1 Quality Selection Policy

The integrity of the ETB collection depends on the type and quality of resources that are included in the collection. A formal selection policy helps to ensure that the selection is consistent and that the quality of the collection remains high.

The following five questions will be asked from each repository when joining the ETB-network. For the reasons of unified responses, a controlled list has been prepared. This information will be provided in form of metadata (namely in Collection Level Descriptors[12]) describing the learning resources (collection) the repository makes available for the network. The label is named "**Quality Selection Policy**", namespace ETB CLD, defining the collection policy associated with the collection.

[12] http://www.eun.org/eun.org2/eun/en/etb/content_frame.cfm?lang=en&ov=3829

Quality Selection Policy		
1. Do you have a Selection Policy for the material included in your collections?		
Yes	Occasionally	No
If you answered "No", it is not necessary to answer the following questions. *You shall only describe the procedure you follow for the selection of the material to be included in your collection/s.*		

2.1 Does your Selection Policy include a Quality Statement?	- National criteria note the URL: - ETB recommendations - other, please specify and note URL:
2.2 Who is responsible for the Quality policy?	- teachers' association - governmental agency - regional or local school - pedagogical organisation /network - national association - content editors/ subject specialists - other (please specify)
3. Who is doing the actual selection of resources to be included in the collection?	- teacher/ teachers' association - content editors/subject specialists - librarian/-s - webmaster - national association - governmental agency - robot harvester - other (please specify)
4. How often are the hyperlinks reviewed?	-daily -weekly -monthly -other pls. specify -never
5. How often does a human review the content of the resources?	- weekly - monthly - ongoing process - other pls. specify - never

The following is an example of Quality Selection Policy metadata record that is available for an end-user:

Quality Selection Policy: **No**
Or
Quality Selection Policy**: Yes**, URL:http://quality.eun.org
Policy responsible: **pedagogical network**
Selection body: **teachers' association**
Hyperlinks reviewed: **daily**
Content reviewed: **ongoing process**

1.2.2 Recommendations for writing a Selection Policy

The five key-questions of Quality Selection Policy form also a simple recommendation for educational repositories on what kind of issues they should consider when writing a selection policy. This kind of a policy statement is recommended to put on the repository's website to explain the selection procedures of the educational material for the end-users.

The main issues to tackle are:

- To have a selection policy for the material included in a collections
- To include a quality statement
- To state who is the responsible body for the policy
- To state who is the responsible body for inserting the material to the collection
- Review of hyperlinks; automatic robot for dead links as well as the human review for the content

1.3 RECOMMENDATIONS FOR REPOSITORY MANAGER

In the context of a subject gateway, the quality of a resource will depend on the users of the service, the nature of the service and the internal features of the resource itself.

The group of repository owners, i.e. managers, curators and/or administrators of an educational server, is strictly responsible for submitting and administrating the metadata records circulating on the network. These recommendations deal with issues that matter for the network; i.e. what kind of material is acceptable for the ETB-network.

Every joining repository carries out documentation processing (source selection, documentary processing, information processing and diffusion) in relation to its target users whose needs have been analysed. However, it is important to emphasise that repositories are not supposed to submit all of the records of resources and collections to the network; quality, European level and good practice of resources are priority issues for ETB rather than sheer numbers.

In order to reflect this approach, the resources should be evaluated considering the following questions, which can be seen as guidelines or recommendations to achieve quality:

a) Information on Collection/ Repository

This section of the recommendations provides quality control at the collection level: it addresses issues that involve general aspects such as the existence, at the Repository level, of an explicit selection process, etc.

b) Information provider/ Source

The quality of a resource is related to the qualifications of the authors and reputation of the source. Author identification deals with descriptive information such as the author', name, position, organisation and possibly other sponsors involved in the production o distribution of the resource.

c) Validity

These aspects deal with the reliability of resources, assessing both its trustworthiness and its being up-to-date.

d) Information Coverage

These recommendations address possible constraints posed by ethical reasons, ideological bias, and cultural diversity. Evidence of bias includes such things as obviously misleading statements, outrageous ones, etc.

e) Composition and Organisation

This section has to do with the internal organisation of the resource, especially with respect to the needs of the intended users.

f) Evaluation of the Medium

These recommendations deal with usability, interactivity, ease of navigation and other presentational issues.

Quality Selection **ETB RECOMMENDATIONS AS REGARD THE LIFECYCLE AND ORGANISATION OF THE RESOURCES**	Yes	No	Not considered
a) Information on Collection/ Repository - Are there stated criteria for inclusion of a new learning resource to the collection? - Has the learning resources been filtered, e.g. peer-reviewed? - Is the subject matter of sites linked to the resources important? - Does the resource have an added European value?			
b) **Information provider/ Source** - Is the resource attributed to a reputable author or organisation, and is that information stated? - Are commercial resources acceptable? - Are private resources acceptable?			
c) Validity - Does the information appear to be well researched, e.g. are references and contact data given? - Is the content of the resource verifiable, e.g. can you cross check the information? - Is there information that has a limited period of use? - Is information is current and up-to-date? - Are all the pages dated with the last revision date?			
d) **Information Coverage** - Are resources that contain advertising acceptable? - Is biased information e.g. are opinions and ideologies acceptable? - Are there subjects which could be censored, e.g. for ethical reasons (please specify)? - Does the resource contain substantive information? - Could the resource be used in another European language/cultural/learning environment?			
e) Composition and Organisation - Is the information clearly organised, i.e. arranged logically and consistently? - Is the resource organised by the needs of intended users' level? - Are key words given to indicate the information content? **-** Is the grammar and spelling accurate?			
f) **Evaluation of the Medium** - Are the resources' ease of navigation/browsing/searching? - Does user support exist, e.g. online help, documentation? - Are the resources accessible for different users, e.g. valid HTML, older browsers?			

2. QUALITY ASPECTS OF WEB-BASED RESOURCES

Thanks to Internet, teachers, students and researchers have the opportunity to publish and search for information and data. Although the Web is very democratic, as it makes a lot of information available to a wide audience, its users are more and more required to develop skills both to evaluate and to publish resources.

In many cases one publishes without having clear answers to the questions: *why*, *what*, *how*. In other words, there is no filter about *content*, *usability*, *accessibility*, *completeness*, *accuracy* and *organisation* of the resources.

Many people think that they can find everything on the Internet, and that everything they find there is good information. The Internet does have a lot to offer, but the quality of the information available is very uneven. A digital resource can be altered very easily, so what you read on the Web may not be the original document, or by original author, or so on.

In recent years the usage of the web has spread out at considerable speed in the European educational context; nonetheless, many resource repositories at the national level have not yet identified explicit policies about what requirements (in terms of content, form, development and process) any collection should follow.

In the educational framework of the ETB project, Web resources play a strategic role: they are seen as a relevant opportunity for learning and for the sharing of diverse cultural backgrounds. It is therefore paramount to guarantee that the resources have been selected according to a set of quality criteria. For example, it could be possible to come across resources that:

- Do not abide by ethical or cultural principles;
- Do not clearly identify their aim;
- Do not clearly identify their target;
- May contain dangerous information;
- Do not clearly identify their sources;
- Do not undergo an evaluation process;
- Are not organised in a coherent and comprehensible way;
- Are not organised according to the needs of the target population they refer to;
- Only contain advertisement;
- Contain spelling, grammar or typographical errors;
- Contain incomplete information;
- Are not easy to navigate;
- Do not have a table of contents;
- Do not have an online help;

- Point to dangling links;
- Do not allow to print separate sections;
- Do not indicate an e-mail address for reference;
- Do not feature proper fonts, animations and images;
- Are out-of-date;
- Offer remote services that are either unstable or unreliable.

It is not only a matter of describing a piece of educational material, or reporting on how a didactic activity has been carried out; of course these aspects have to be duly considered. But some attention should be paid also to the issue of being able to describe an educational experience in a given, understandable didactic context, so that other teachers can autonomously evaluate its reusability *in their context*. Here the issue of transformability of a learning resource to another educational, cultural and language context rises.

This is a constant concern in the ETB approach. It should also be noted that differences in social and cultural contexts are very hard to include in quality models. It is therefore important that the model, if aimed at supporting teachers and students in their teaching and learning experiences, be sufficiently "open", so these differences are not locked into rigidly determined, single-minded processes or methodologies.

The repository manager decides whether an Internet information source should be linked to a resource guide or library Web site, or evaluates the quality or appropriateness of information for a particular query or user. Without explicit criteria for the selection of the sources, repository risks to waste the users' time with links to resources and tools of dubious value.

2.1 THE ETB QUALITY MODEL

The end users of educational repositories can be identified along the following main characterisation: on one side there are the repository administrators, curators, librarians and webmasters, on the other side there are the teachers, students, principals, and other interested in educational resources. Each actor might embody both the "customer" function (whenever they look for suitable material to re-use) and the "provider" function (whenever they publish material they deem useful for other schools).

The main purpose of the model is to help the web maintenance team and the technical staff of repositories better understand how their work is connected and related to the teachers' work.

> "It assumed that teachers' work may be organised into three activities: preparing, conducting and evaluating an educational activity. The teacher interacts mainly with pupils (students) and is subject to forces like government, municipalities and parents that either directly or indirectly affect his/her work.
>
> From the web repository management's view, it is important to know how some major characteristics of educational activities such as lessons, may be translated into their work and work language. It is therefore important to publish high quality and suitable information with good inherent or possible learning capabilities, that the source invites to exploration and stimulates the curiosity" (Günther Dippe, see the part 3 that is relative to teachers).

ETB judges four factors valuable for quality assurance of the learning resources that are submitted to the network. These factors are **Trusted Source** (as explained above), **Usefulness**, **Attractiveness** and **Satisfaction**. These four factors of quality of material are top-level terms containing several sub-factors, which are, in their turn, again linked back to the top-level factors (see Figure 1). These factors don't pretend to be exhaustive standards of quality, but more acting as methodological guidelines and recommendations for achieving better quality.

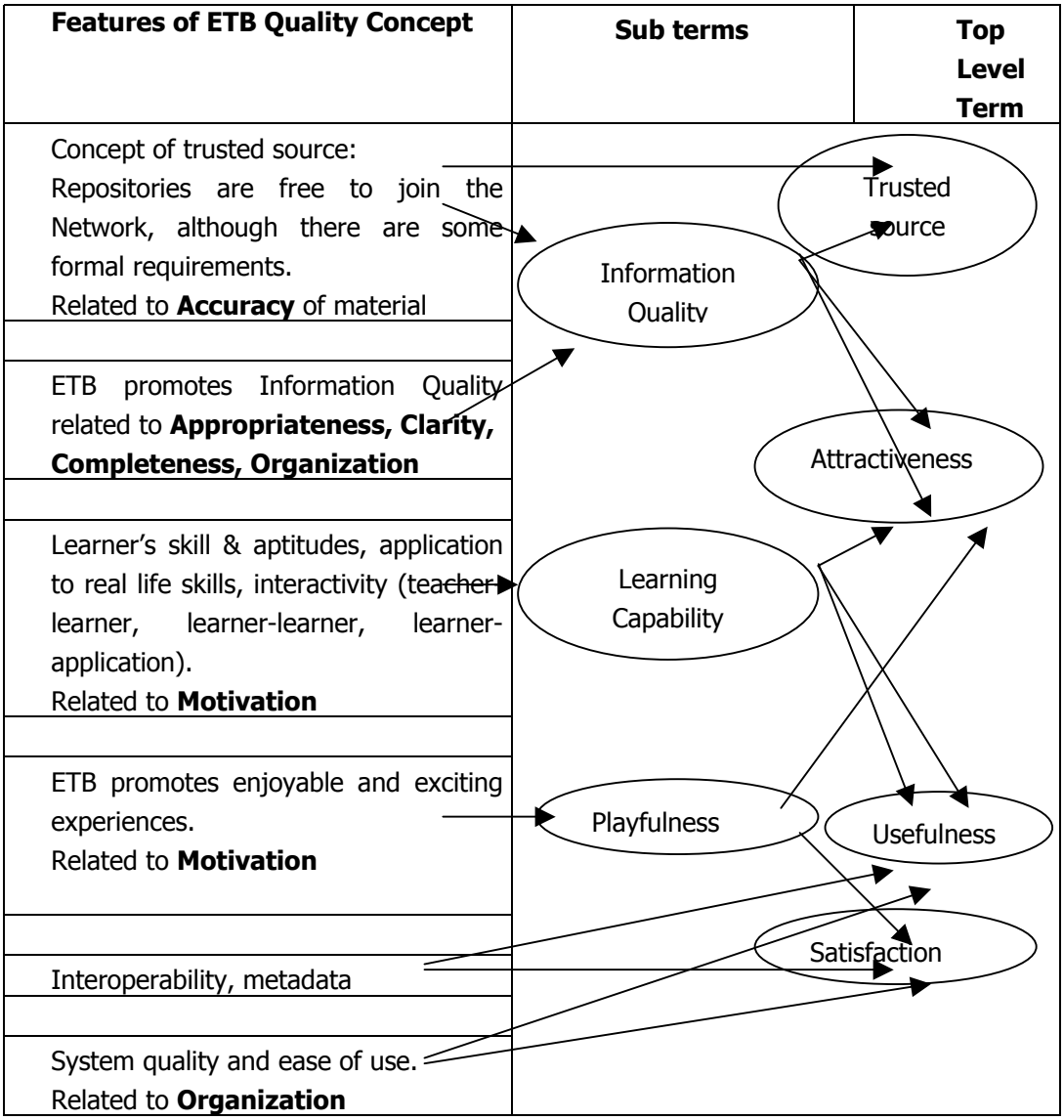

Figure 1: factors judged valuable for ETB and sub-terms.

Usefulness, for example, is linked to the 'Information quality' and 'Learning capability' (see Figure 1), what kind of skills learner gets from using the material. Since each learning situation is different it is impossible to define one set of quality standards that will fulfil all the needs of end users. This is why the metadata records of learning material, i.e. documentation system of resources (see ETB datamode[13]), attempt to describe the frame and setting as well as possible.

This is where the factor **Usefulness** is linked to the metadata issue; how well and detailed the metadata records of learning material are described, structured and if they are consistent. Naturally, if all the elements of the ETB datamodel are used the information of the material is more complete and more informative, hence of higher quality.

This emphasises the importance of use of factor **Satisfaction** too. ETB believes that if the end user is provided with enough information of the resource s/he will be able to decide weather a piece of material in concern meets the standards s/he has in mind. Thus, the overall satisfaction to the material, and also to the documentation system, will be enhanced.

The factor for **Attractiveness** of resources might sound pretentious and outplace in the list of factors judged valuable. But the playfulness and attractiveness is not to neglect, after all it is an important asset of using ICT in the educational setting. ETB promotes explorative, innovative and enjoyable learning material that can make educational setting appealing and attractive to its audience.

[13] http://www.en.eun.org/eun.org2/eun/en/etb/content_frame.cfm?lang=en&ov=5874

2.2 QUALITY CONTROLLED SUBJECT GATEWAY

ETB-network can be classified as a subject gateway to educational resources on the Internet. Subject gateways are Internet-services that help systematic resource discovery, and add value to Internet information because they collect resources from the Internet with regard to subject matter and quality criteria.

In this section some characteristics are listed that will be used to define "quality controlled subject gateway".

> "The integrity of a collection will depend on there being some consistency in the type and quality of resources that are included in the collection. A formal selection is consistent and that the quality of the collection remains high.
>
> A selection policy can ensure that the same member of staff makes consistent judgement about what they include in the collection. It can also ensure that the different members of the staff team make consistent judgement and that they are all using the same collection criteria.
>
> The selection policy can help new staff to understand quickly both the nature of the collection and the criteria they should use when selecting new resources to add to the gateway. A Formal policy can also help to ensure consistency of selection policy can help ensure that the combined collection has a consistent level of quality" (Belcher et Al. p. 42, 2000).

The metadata records of learning resources submitted to the ETB-network should be homogeneously organised and structured and they should be described by means of common documentary standards and tools established by the system. The following framework is partly derived from the DESIRE's selection criteria[14] and adapted to ETB.

[14] DESIRE – Development of a European Service for Information on Research and Education, D 3.2.2

2.2.1 Scope of the services

The subject gateway should be considered the first filter for the resources.
The definition of its scope should originate from the analysis of the information needs of the target users.
The scope of the gateway includes:

- Information coverage; it will include all the subjects (national repositories) that have a relation with educational context;
- Geographical coverage; there is no restriction relating resources from geographical Europe.
- Language; resource in all European languages will be accepted
- Access issues; it is relative to technology and cost.

2.2.2. Content Criteria

Evaluating the information content is a primary concern when dealing with Internet resources for education. It could be evaluated using the following criteria:

- Accuracy; the resource must be reliable, valid and authoritative.
- Clarity; the resource must provide a clear link between the purpose (goals, objectives) and the content and procedures suggested.
- Appropriateness; the resource must contained information for the intended learners' level. The information must use appropriate vocabulary, language and concepts.
- Completeness; the resource must include wide information related to self-contained activities, material required, prerequisites, information for obtaining related resources, assessment criteria, link to quality indicators.
- Motivation; the information must engage the learner with interest and satisfaction.
- Composition and organisation; the resource must be easy to use both for teacher and pupil. It must flow in an orderly manner, using organising tools (heading, map) and avoiding use unrelated elements that are potentially ineffective or overpowering.

2.2.3 Subject access

A sophisticated indexation system and the usage of a controlled vocabulary can increase the quality of subject access to a collection. The assignment of high level subject categories to provide a browsing structure and/or the use of keywords to assist searching can be considered the minimum level of subject description for the content of resources.

2.2.4 Form Criteria

The resources should have a documentary organisation on the cataloguing integration and the access to the primary document; resources should be documented through the use of documentary standards common to the project.

- Ease of navigation; the information should be user friendly and easy to navigate
- Provision of user support; the information should provide an adequate user-support as instructions, documentation etc.
- Use of recognised standards; the information should use a recognised standard as metadata, standard HTML etc.
- Aesthetics; the resource should be designed follow a good design principles (i.e. balance between text, images, links, headers etc)

2.2.5 Process criteria

Process criteria are based on the processes and systems that exist to support the information.

- Information Integrity; information contained in the resource should be up-to-date; the resources should be time-sensitive etc.
- Site integrity; the site should be regularly and frequently updated and maintained.
- System integrity; the selected resources should be technically acceptable, accessible and stable.

2.2.6. Collection management policy

Collection management policy determines how resources will be selected or removed in the light of the collection as a whole.

- Update frequency with new resources; the resources should be updated/linked with new resources
- Availability of the Internet resources; the resources should be readily available
- Regular link checking; the resources should be regularly checked.

2.2.7. Information integrity[15]

Information contained in the resources should be updated; the duration of the information should be indicated as well as their liability with the passing of the time, the intervals of their updating, on times and proceeding of the updating. The provider should be responsible for these indications.

2.2.7.1 Site integrity

The site integrity should permit the users to know if the site is current and accurate; in fact, the dates of the last updating should be indicated; there should be no dead links; the resource version number should be provided.
The updating frequency should be described. The organisation or the person should be responsible of keeping and managing the resource in a stable way.
Webmaster should be responsible for providing these indications.

2.2.7.2 System integrity

The selected resources should be technically acceptable, currently accessible, and should not present frequent overloads. The resources are often volatile and they change with the passing of the time. ETB should aim at selecting resources that are actually accessible, stable and properly updated.

The system should be stable and adequate measures should be taken to keep the system integrity. The system administrator should be responsible for providing these indications. The resources, which should be included in ETB, should be relevant to the ETB scope, to the target users and the identified materials and should be assessed according to agreed selection criteria.

[15] See D4.1 Criteria for the selection of materials to be included in ETB Treasury Browsers at http://etb.eun.org

3. RECOMMENDATIONS FOR TEACHERS

3.0 INTRODUCTION

> The educational system and the surrounding society seem to change rapidly nowadays and what was true a couple of years ago might not be true today. We constantly need to evaluate and re-evaluate our standpoints to be able to give the best possible education to our pupils and students. This part of the deliverable won't deal with the teacher education.
>
> This framework clearly shows the connection between the pedagogic and didactic aspects of teaching and learning and the evaluation of web resources to be used in K-12 education. The main objective is not to give answers but rather to stimulate the discussion and development of this or similar kinds of approaches. The local demands and needs must be taken into account and necessary adjustments should be made. (Günther Dippe)

Man, at least in the industrialised world, seems to have an urgent need to make what's invisible, visible. Quality is something invisible which we spend a lot of effort and money to make visible, usually with the aid of one or several models as within the ETB-project. We also use quality assessment to provide quantitative and/or qualitative data to measure and describe not only improvements and achievements, but also how they change over the time. This calls for repeated assessments.

Another important related tool is quality assurance, which differs from quality assessment since it implicitly demands feedback to allow for discussions on how to improve the service from different point of views. This also includes the preceding processes of the delivery of the service.
In short, one may say that quality models help us point out the key concepts and that quality assessment and quality assurance give us data and feedback, which help us improve the quality of the specified work.

It should be noted that different kinds of evaluation are often used to change the behaviour of an organisation and consequently the people who work within the organisation. This behavioural change is often described with terms like; efficiency, improvement, goals, result, etc.

The problem becomes quite apparent when we start thinking that the evaluation is not derived from quality itself but rather from our perception of what quality is. Somebody has put forth and explained a model which others more or less accurately have interpreted, which in turn is used as a basis for evaluations.

Quite extensive research has been done within the field of educational evaluation since the beginning of the previous century but in the past 20 years the focus has been on questions like ”How do we construct tests which measure complex and analytical thinking and problem solving skills?” But we also need to be able to answer how we can evaluate i.e. creativity, the ability to make ethical standpoints, aesthetic abilities, how apt pupils’ are to feel empathy, and their ability to interpret socio-cultural phenomena.

In education, where learning and to a lesser extent training is the foremost goal, it is very difficult to evaluate and qualitatively describe other than small and clearly defined areas. It is a multi-dimensional system with many more or less visible actors and a very large number of variables that interact in a highly dynamic system. We are never able to describe the wholeness since the sum of the parts that we eventually manage to understand never equals the ever changing whole.

In this part of the deliverable the perspective to a discussion is on how to improve the quality of teaching with the aid of web-based resources. This in itself represents a great number of considerations and problematic areas. K-12 teachers are not an especially well defined target group and since it here encompasses teachers throughout Europe this statement is even more accentuated.

The later part of this report focuses mainly on a set of questions, which are important to ask and which hopefully will aid you when choosing resources to fit your purposes and your teaching intentions and needs. How your school is organised, the socio-cultural environment, existing ICT prerequisites and the knowledge how to use them are only casually remarked.

This paper is intended to encourage reflection and work with quality issues within this area and discuss them with your colleagues. There are no simple answers but rather a process to start, which will lead to a richer teaching and learning experience for you and your pupils.

Read this paper from a broad perspective and keeping in mind that it only represents one point of view and experience after teaching in secondary and upper secondary schools. The writer, Gunther Dippe, currently works at university level in Sweden, albeit he visits and has contact with teachers in other countries.

3.1 THE TEACHING ENVIRONMENT

With a few words I shall paint the landscape of teaching and learning. It is generalised and probably also overly simplified, but it serves as a short introduction to those who are not teachers.

A broad definition of what we'd like to achieve with our teaching is that it...

> *should be conducted clearly and consciously in accordance with the specified goals to aim for; that learner's results are good in relation to the goals pupils should have attained on completion of the course...*

…and that this takes place in a positive social climate (Nixon, 2001).

The teaching environment cannot solely be described from a classroom point of view. It is also to a great extent affected by the institutions that surround the teacher and the pupils, which in turn are part of a larger social context that reflects political, social, cultural and economic factors (Feiman-Nemser, Flodén 1996)[16].

This wider context may be seen as the actual borders wherein teaching occurs. Even seen from a single schools point of view, it is a very complex system with a large number of different interactions between the participants. It is also subject to rapid change, which has accelerated during the past decade and seems to continue into the new millennium. Two examples may be used to illustrate this change. Student's families are generally becoming an increasingly important group and are today more involved in schools and their internal work than maybe fifteen years ago. The second example is the policy-makers ongoing efforts to regulate more in detail both the teacher profession, and what is being taught in schools (Mahony, Hextall 2000). These trends seem to be valid throughout the European union with few exceptions.

Most adults don't have any problems recognising the classroom of today. Doesn't school change? It certainly does but there is a historic factor that must be considered. The teacher of today was taught most of his/her present "how-to-teach" maybe 20 years ago from a teacher educator who at that time was taught his profession 20 years ago. The apparently long-lasting influences from the past may be seen as a problem but the school as a system has proved extremely good for centuries at proving its robustness and capabilities even during i.e. world wars, economic depressions and other rapid changes in the society.

[16] ibid, p. 62.

Within the classroom setting (or any specified physical or electronic learning environment) there are broadly speaking the didactic and the social dimensions of teaching and learning. The didactic dimension contains all the elements of what, how and why teaching is executed. The social dimension is the complex web of interactions between students and between the student(s) and the teacher in the classroom. But the discipline of didactics may be more broadly viewed as i.e. Bengtsson (1997) argues.

> No teaching is possible without choices concerning goals, contents and methods. Therefore, it doesn't seem plausible to leave the questions of norms and values outside the discipline of didactics. An integrated didactics should, according to my point of view, be able to include norms and values.

The students are today subject to a greater push from society to proceed to higher education. This has changed higher education from earlier being largely reserved to a few students from wealthier and/or more academic backgrounds to nowadays encompassing a greatly increasing number of students from the whole society. If this has had any consequences on the educational content and the teaching in secondary, and especially upper secondary schools is beyond this report to try to answer but it might be worth considering this aspect from a teacher's point of view, especially in the light of the student's easy access to vast information and communication resources via the web and other Internet-based services.

3.2 ABOUT TEACHING AND TEACHER KNOWLEDGE

How do teachers relate to their knowledge and their profession? Andersson (1998) chose five main patterns as classification scheme after having analysed his in-depth interviews, which took place during four years with 10 teachers. He described the personal, scientific, methodological, administrative, and the didactical patterns. It should be noted that the different patterns do not have sharp boundaries and they all contain to a lesser or greater extent influences from all of the others.

- A personal pattern is characterised by relating his/her teacher knowledge to the own person. These teachers often see themselves as "tools" in the classroom. They also point out the importance of life experience and personal growth as important for being a successful teacher.
- The teacher with scientific pattern stresses the importance of scientifically founded theories about teaching and learning and focuses mainly on the "knowledge transfer" when teaching. The social dimension of teaching is also often strongly influenced by scientific knowledge.

- The methodological pattern is characterised by the focus on the implementation of work methods to achieve the learning goals. Teaching is largely a matter of being well organised.
- The administrative pattern might be considered as an extreme expression of the methodological pattern. Control of the situation via planning characterises these teachers' work.
- A teacher with a didactical pattern is focused on the subject matter knowledge and how this knowledge most efficiently can be transferred to the pupils.

All the interviewed teachers have subject matter knowledge, the engagement in their pupils, and the "inner force of teaching" in common which then might be considered the core of teaching.
It should be noted that Andersson points out the difficulties with this classification depending on his own perspective as a researcher.

3.2.1 How is a teachers' knowledge formed and expressed?

The contextual situation is of utmost importance in teaching and learning (Alexander 2001). How the work is organised regards teachers, pupils and subject matters therefore play an important role as well as the physical environment.

How is the teachers' knowledge expressed in their teaching?
Andersson (1998) found among others, the following expressions:

The teacher...

- creates positive expectations by having a professional and a personal engagement
- ability to co-ordinate several occurring processes in the classroom
- ability to relate the short term goals to the long terms ditto
- balances between high expectations and the respect of the pupils
- corrects pupils without "making a scene" and also knows when it's better not to correct them
- is conscientious about controlling and following up pupils who haven't understood or who have been absent
- continuously monitors pupils' achievements.

Robinson (1994) points out the importance of dialogical interaction with the pupils as one of the means of teacher empowerment, which could be related to the first item in Andersson's list.

3.2.2 Ever-changing youth

About 10% of a pupils' total time on a yearly basis is spent in the classroom. It is therefore legitimate to ask what the pupils' do and experience the other 90% of the time and what consequences this has for the teacher? A student (18 years old) recently told me that he doesn't understand the culture of young teenagers anymore! Since the average age of teachers is relatively high in most countries within the EU, this short statement points out a daunting task for teachers of today especially since the one-way communication to a greater extent is replaced with dialogues in the classroom. What knowledge and probably even more important, what social competencies are needed by the teachers' nowadays? How do we communicate with our pupils with different social and cultural backgrounds so that they may understand us and we understand them?

Wim van Veen at the Centre of Educational Innovation and Technology at Delft University of Technology (http://www.dido.tbm.tudelft.nl/Medewerkers/wimv/) refer to the youth of today as "homo zappiens". They are able to watch three different TV programs at the "same" time and being perfectly able to follow the different stories. They can do this because they are able to quickly recognise when parts shown do not have any importance for the story and they immediately "zap" to the next program.

I was taught some 25 years ago to make my homework in a quiet and well-organised room, which is totally contradictory to how many pupils' today study at home. The pupils work with the computer, listen to music, eat and drink and even glance at the TV while at the same time making their homework. They seem to have a much better developed or trained "multiprocessing" capability than earlier generations.

We don't know to what extent, if at all, the present ways of teaching use these apparent abilities many pupils seem to have today. It is also somewhat disturbing that we don't know how these skills may be used to evolve our society in the future. It seems reasonable that more pupil-oriented teaching can exploit these new skills.

3.2.3 The web site quality model

In the report "Research on Quality Assessment Management and Selection Criteria regarding Content for Schools" (EUN ETB project) I proposed the below model of main factors, which affect the quality of web sites and web resources used in education. The main purpose of the model was to help the web maintenance team and the technical staff of repositories better understand how their work is connected and related to the teachers' work.

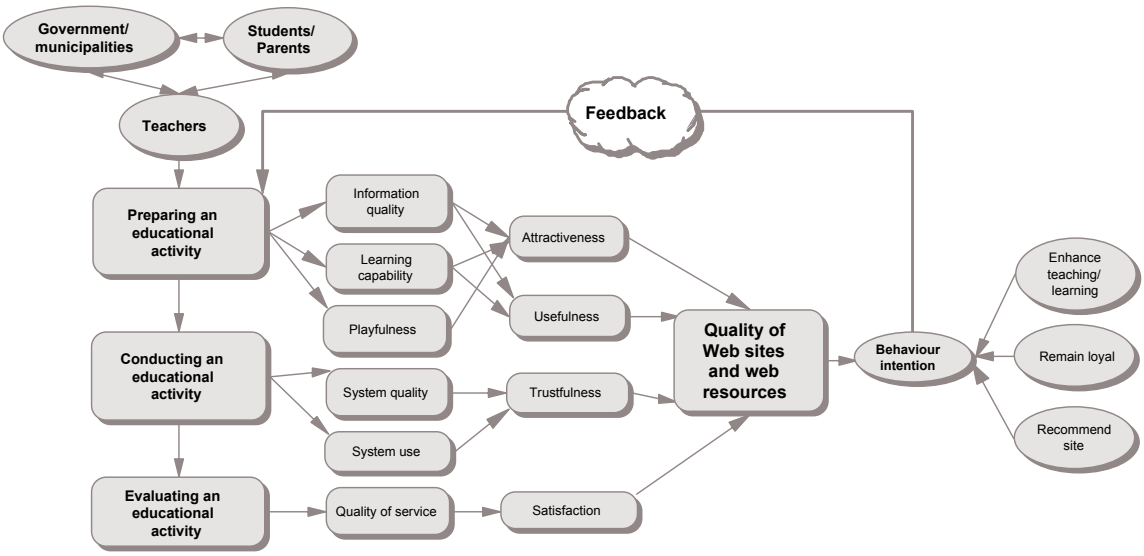

Figure 1. Proposed model of main factors, which affect the quality of web sites and web resources used in education.

The goal of every web site manager is to steer our behaviour in some way. The purpose is to influence us to behave according to the predefined purposes of the web site whether it is to present some specifically chosen information, buy goods or services, make you vote, participate in discussion groups etc.

In the model above, it is assumed that teachers' work may be organised into three activities: preparing, conducting and evaluating an educational activity. The teacher interacts mainly with pupils (students) and is subject to forces like government, municipalities and parents that either directly or indirectly affect his/her work.

From the web repository management's view, it is important to know how some major characteristics of educational activities such as lessons, may be translated into their work and work language. It is therefore important to publish high quality and suitable information with good inherent or possible learning capabilities, that the source invites to exploration and stimulates the curiosity. The latter is the "playfulness" of the source.

The web resource should be easy to navigate and display quickly. This is also part of the usability of the web resource.

The overall quality of the web resource makes the teacher use the resource again. This layer is also used for evaluation since the next level, which consists of attractiveness, usefulness, trustfulness and satisfaction, is closer to how we would subjectively describe a web resource. The goals for both the teacher and the manager of the web resource are to enhance teaching and learning. The web repository manager wishes the visitor returned to the site and also recommended the site to others. The core of the model is behavioural change, e.g. learning, we want to promote.

The broad term "educational activity" is used instead of the narrow descriptor "lesson" even though an educational activity generally is assumed to be a lesson. But I chose educational activity to point out that even in-service training or a teacher's conference is what I consider a preparation for an educational activity since it develops the teachers' professionalism. A versatile web repository to be used in education cannot focus solely on lessons. It should rather be a general resource covering most aspects regards teaching and learning.

3.2.4 Information technology, education and culture

One important criterion for every profession is its specific working language. A German teacher and an Italian teacher understand their respective professional languages, when translated, much better than they understand the language of engineers in Germany or Italy. This is why co-operation between different professions and academic departments often is a very challenging task. We refer to this as multicultural and the carrier of all cultures is mainly the language even though body language, dress code and non-written rules often are important too.

We all have different notions of what learning really is. Whether something is a piece of technology or not is much easier to define. Basically is learning a more or less lasting change of behaviour (Marton, 1994). Learning is also a life-long continuous process, which cannot be stopped.

Technology may be thought of as a set of different and sometimes interconnected tools that we mainly use as a complement and enhancement of what we are less able to do without them (and sometimes not able at all to do without them).

The notion of efficient learning is often confused with efficient training, which is mostly related to being skilled at doing something practical. Simply put, one can train or be trained at repairing a broken engine but one has to learn how to make a standpoint concerning a moral issue. In training, learning is always involved to a greater or lesser

extent but learning doesn't necessarily involve training. True learning also demands an active and a free choice of the individual to change.

Compare the two following questions and try to analyse how the thinking differs to be able to ask them.

- Which elements of learning can be included in a framework of learning technologies and which cannot?
- Which elements of learning technologies can be included in a framework of learning and which cannot?

These questions are connected to how we view ourselves in relation to the artefacts we create and may thus be seen as ontological questions.

3.2.5 Using ICT in education

My point of view is that ICT in education...

- is one of several means to reach the defined goals in education
- is about how it is used to promote teaching and learning rather than on the technology itself
- is that it has the prerequisites to be a valuable set of tools to aid the development of pedagogical work and work methods
- is that its usage must have the didactical context and content as the starting point
- is that the pupils and students work situation, development, achievements and results must guide how it should be used and developed for educational purposes
- is that its usage should be explored and evaluated in all different fields of the pupils work in school
- is that the teachers professional development increasingly will be dependent on the ability to utilise these tools
- is that poor and inferior teaching will still be poor and inferior with the aid of ICT.

Is it different preparing a lesson where web based resources are used compared to when they not are used? Basically the answer is no. You have to make the necessary preparations as with any lesson.
But as with any technical support systems there are a few more uncertainty factors. I will ask a few of the more obvious ones but there are local conditions that I'm not aware of and there might also be important questions unintentionally left out.

3.2.5.1 IT-related questions

Do the Internet-connected computers and the Internet connection work? Do you and your pupils have a working user id and password for the computers you are going to use? Is the net congested at the time you will use it, which would result in slow response times and maybe impatient pupils? Do the software work on the computers you are going to use? Are the necessary plug-ins (small support programs for the web browser) installed, which may be needed and do they work? The probably most widely used one is the Acrobat Reader plug-in and the accompanying Acrobat Reader program. If the students are intended to print information, you should try to calculate how long time it takes for the number of pages you predict they will print. Does the printer work and are there enough ink or toner and paper? Do you or any of your students know how to fix a paper jam in the printer? Do any of your pupils have other technical skills that might be useful to fix common IT-related problems? Do you know how to restart a computer, if it "freezes"? Is it possible to quickly get in contact with support staff when needed? Does your lesson plan break down if one of the computers does it?

3.2.5.2 Questions about the physical environment

You might also consider asking some questions about the physical environment. Desktop computers generate a lot of heat and their fans whirl around quite a bit of dust if the room isn't clean. Students with allergies might suffer from this. Does the sun shine directly into the room at the time for your lesson and thereby generate excessive heat if the ventilation is insufficient? How are the computer monitors arranged with respect to the incoming light? Does the room acoustics together with the furniture generate a lot of noise when used and how does this then affect your lesson plan and the pupils' work? How are the technical environment and the physical environment adapted for pupils with special needs or different kinds of handicaps or disabilities?

3.3 ONE POSSIBLE LESSON SCHEME

To be able to suggest how teaching may be improved with the aid of web based resources I need at least to outline one possible lesson scheme. I am aware that many teachers will have other and more elaborated schemes than this one, but it serves as my generalised reference. I found it at http://www.share.itgo.com/Didactics II/DIDACTICS II - 3_2001.htm. Professor Omar Villarreal wrote it on June 21st 2001, and it is intended for language lessons but the abbreviated outline presented here is general enough to basically serve most other lessons and subjects too.

> *Within the logical variation of objectives, subject matter content and the various functional and grammatical applications that every lesson affords, each lesson should be organized along a common pattern of:*
> *(1) activation,*
> *(2) presentation - comprehension - clarification,*
> *(3) application,*
> *(4) reflection.*

1) Activation of the students' previous knowledge and making connections to the new student tasks.
2) New and unknown content must be presented, clarified and made comprehensible to the students.
3) Students need to apply and practice what they learned and apply it both at the macro and micro level. In language studies this could be i.e. conversation respectively spelling. This can be done solo, in pairs, in small groups or with the whole class.
4) The pupils are systematically asked to reflect on the different aspects of the material or part of the material covered in the lesson.

Time needs to be introduced both with regard to the single lessons and the short and long-term goals. Alexander (2001) has structured a number of major factors and how the length of the lesson affects these factors. In his report it is used to compare cross-cultural differences and may as such, also serve well within the European Union. He also argues that a lesson's "pace" and "episodic structure" may play an equally important role within the time concept.

Pedagogical factor	**Shorter lessons (20 - ca 45 min)**	**Longer lessons (more than ca 45 min)**
Lesson structure A	Formulaic, fixed	Developmental, flexible
Lesson structure B	Short, regular episodes	Irregular, mixed length episodes
Balance of oral/written	Mostly oral	Mostly reading, writing
Pedagogic language	Precise, formal, technical	Imprecise, conversational, vernacular
Teacher questions	Mainly closed	Mainly open
Learning focus	Narrow	Broad/diffuse
Teaching emphasis	Subject-matter emphasis	Affective/behavioural emphasis
Teacher messages	Linear, cumulative	Multiple, complex, simultaneous
View of knowledge	Codified, rule-bound, received	Uncodified, negotiable, reflexive

Table 1. How lesson length affect pedagogical factors.

Should the above table be interpreted that short lessons are generally bad for the students and longer ones are good? No! It simply points out how time affects the lessons. Varying length of lessons as well as variation within the lessons are important factors to improve pupils learning too.

3.4 UNDERSTANDING HOW TO DEVELOP EFFECTIVE TEACHING METHODS

In order to improve our teaching we need to know more about how pupils understand specific phenomena in our world. The following citation by Marton (1994) clearly points out this.

> Each phenomenon in our world can be seen and understood in only a limited number of distinctively different ways. ... Understanding is defined as the experiential relations between an individual and a phenomenon. Changes in a person's understanding constitute the most important form of human learning. To determine the effectiveness of particular teaching methods, it is necessary to specify the kind of learning and understanding a teaching method is designed to bring about. In order to develop teaching methods that help students arrive at new understandings of a given phenomenon, we must first discover the finite ways individuals may understand that phenomenon. Then, through experimentation, we may discover the most effective ways to bring students from a given conception to another, more advanced one, that is, from "misunderstanding" to understanding. Consequently, teaching methods must be characterized and developed in relation to each phenomenon that is taught.

Not only is the understanding of different phenomena important. The teacher and the student act within a social setting which affects the teaching and the learning outcome. I picked two important theories, which have helped teachers to gain a deeper understanding especially about pupils' learning. They are constructivist theory and socio-cultural theory emanating from mainly Bruner and Piaget (1896 - 1980) respectively Vygotsky (1896 – 1934). Bruner stated that learners construct new ideas or concepts based upon their current/past knowledge and that the instructor should try and encourage students to discover principles by themselves. Piaget studied knowledge development in children and is credited for shifting the focus from the teachers' teaching to the pupils' learning. Vygotsky is mainly known for emphasising the influences of cultural and social contexts in learning. An excellent overview of different learning and instructional theories can be found at http://tip.psychology.org/theories.html.

Andersson (2001), who is a researcher in the science-didactics field, has formulated an approach that to some extent tries to merge (not a completely correct scientific explanation) these theories into what he calls a social-constructivistic[17] view on

[17] Lev Vygotsky, a Russian psychologist and philosopher in the 1930's, is most often associated with the social constructivist theory but Andersson also applies Piaget's and Bruner's research to formulate his approach.

learning and knowledge. Briefly it states that the pupil's knowledge is individually constructed but socially mediated. Since social mediation plays an important role for the individual's construction of knowledge there are opportunities for the teacher and the school setting to influence the pupils thinking.
Much attention is paid to trying to understand how pupils think as this short table tries to exemplify.

"Everyday explanation"	**Scientific concept**
Seeing depends on the eyes ability to send sight-beams.	Seeing depends on the reflection of light into the eye.
Matter disappears when it is burnt. Only a little ash is left.	Matter (mass) is preserved in chemical reactions.
The temperature of a hot plate decides the boiling temperature of water.	The boiling temperature of water is. 100°C. It doesn't depend on the the temperature of the hot plate.

Andersson (2001) wrote "The responsibility of the teacher is to create opportunities for the pupils to move from 'everyday thinking' to scientific understanding and evolve this as far as possible."

We generally acknowledge that the teacher's teaching goals are important but what about the pupils understanding of their learning goals? Learning is an intellectual activity and how can we expect our pupils and students to learn if they cannot, in their own words, formulate what these goals are? But this is not enough. They must also be able to formulate what they already know or have learned, what work method is the most suitable for the new learning task and finally they must decide the best way to present or show their newly acquired knowledge. These tasks must be written by the pupils and made an active part of their learning and the teaching. The teacher's role will by necessity change from being strictly teacher oriented to also include roles that resembles the one of a coach and learner guide for the pupils.

The teacher's task is in a sense to cut the umbilical cord with the pupil so that she eventually will be a proficient learner by herself. What I presented here might be new to you and you may also wonder whether it is being practised successfully? Yes, it has for at least three years, at i.e. Fridaskolan in Vänersborg, Sweden (http://www.fridaskolan.se/). According to the principal, the pupil score significantly better on national tests than they did before this change and the trend is still positive with better and better results for each year. It should be noted that this teaching transformation took up to three or four years and that all teachers at the school had to be involved in the process.

3.5 QUESTIONING INSIGHT WHEN EVALUATING WEB RESOURCES

To sum up what has been written so far, we have a framework that can be used to start examining web-based resources from a teaching and learning perspective. The questions asked here should be seen as a starting point and not as final questions. Use and/or modify the questions so that they suit your teaching and learning environment. Some of the questions are probably not applicable for the subject matter you teach and should be omitted. It is certainly also necessary for you to ask the questions that concern the micro level of your teaching and the pupil's learning. Write your own set of questions to be used when evaluating the suitability and usefulness of the web-based resources you explore. If you modify the questions and discard some of them, they can also be used, as an aid for the pupils' own exploration of resources and become a useful tool for them to increasingly be more independent learners.

- How can the resource, seen as a learning technology, be used within a teaching and learning framework?
- Use table 1 in this report as an aid for your pedagogical questions.
- In what ways does the resource's context differ from your and the pupil's context and how do you handle this difference?
- Are the intended use of the resource and the target groups clearly pointed out?
- How do the goals presented by the resource comply with your and your pupil's short-term and long-term teaching and learning goals?
- How does the resource help you and the pupils to reach your defined teaching and learning goals?
- How and in what ways does the resource promote teaching and learning with regard to the defined learning goals?
- How does the didactical context differ from your goals and how do you handle these differences?
- How does the resource support your short-term and long-term lesson planning?
- Are the information and/or exercises presented clearly and logically? What clarifications are needed? Are the links to other resources valid and do they work?
- Do your pupils understand the presented material of the resource?
- What do the pupils already know and what is new to them?
- What different levels of difficulty does the resources contain? Does it challenge all your pupils?
- Is the resource aimed at solitary or co-operative work? What other methods is the resource aimed for?
- How does the resource support the dialogical interaction between you and your pupils?

- In what ways can you and the pupils themselves control the learning outcome?
- What level of complex and analytical thinking does the resource demand?
- How does the resource support problem solving and what different kinds of problem solving skills are needed?
- How does the resource aid and strengthen your pupil's scientific thinking?
- How does it develop the pupil's creative and aesthetic abilities?
- How does the resource develop the pupil's ability to feel empathy and is it non-biased regards i.e. culture, religion, sex, social circumstances etc?
- In what ways does the resource stimulate the pupil's curiosity and encourage exploration?
- How does the resource help you and your pupils reflect on the learning outcome and achievements?

3.5.1 Writing a logbook

In order to promote your teacher development, I suggest that you start writing a logbook on a daily basis. It is especially useful for teacher workgroups as it can serve as a very useful aid in your discussions of both short-term and long-term teaching goals and development. It promotes and focuses your discussions on what you felt important at the time of the teaching experience. Our memory is very subjective and tends with time to substantially change what we experienced. Writing a few sentences will effectively help you reconstruct more correctly the actual experience. It shouldn't take more than five minutes a day when you get used to writing it. You may of course ask other questions than the suggested ones but it is better to try to establish a short and lasting routine than quitting after a couple of weeks because it takes too much time to write.

Use your favourite word processor and create a table with five columns. Check whether it supports "repeating header rows", which makes the headings repeat on every page (MS Word does it). You can use a spreadsheet but I find it more convenient to use a word processor.

Date	Activity	What did I do?	What did I learn?	How can I improve?

Table 2. Suggested headings for the teacher logbook.

4. SET OF RECOMMENDATIONS FOR EUN NATIVE REPOSITORY USERS

This **Set of Recommendations** aims at teachers who want to add web-based learning resources to the ETB-network. This can be done through the EUN native repository, where all the interested actors of European educational field are able to add web-based learning resources to the ETB-selection. Before these suggested learning resources are submitted to the ETB-network, they will pass through a EUN editorial selection.

These recommendations deal with the aspects educators should keep in mind while they create the content of their own material. In other words these recommendations are focused on the process of developing the resources. The following list does not pretend to be exhaustive, but give guidelines for users.

These recommendations are also good to keep in mind when searching and selecting already existing learning material or products from the Web. The recommendations on the developing process of material are much in agreement with GEM's indications and with DESIRE.

1. Accuracy: the resource must be reliable, valid and produced by a trusted source; information should be impartially presented; the resource must not contain biases, mistakes or omissions.

2. Appropriateness: the resource should contain information for the intended learners' level; the resource should use an appropriate and suitable vocabulary, language or concepts, avoid mistakes or stereotypes.

3. Clarity: information should provide a clear tie between the purpose (goals, objectives) and the content and procedures suggested. Correlation should be comprehensive and obvious. Redundancy is usually unwelcome and isolated activities without a relationship are superfluous.

4. Completeness: the resource should be complete, i.e., offer all essential information and elements, as well as inclusion of such components as self-contained activities, materials required, prerequisites, information for obtaining related resources, assessment criteria, links to quality indicators and standards. The resource should offer wide and in-depth information related to the topic.

5. Motivation: the resource should achieve the active engagement of the learner and be interesting, innovative and appealing, build on prior knowledge and skills, and promote relevant action on the part of the learner.

6. **Organisation**: the resource should be easy to use and logically sequenced, with each segment of the resource related to other segments. It should flow in an orderly manner, using organising tools (i.e. headings, a map, etc.) and avoiding use of unrelated elements that are potentially ineffective or overpowering; it should provide for references, bibliographies and other supporting materials available for the users.

4.1 CHECKLIST FOR USERS OF EUN NATIVE REPOSITORY

1. Accuracy:

- How can the resource, seen as a learning technology, be used within a teaching and learning framework?
- Is the information current and up-to-date?

2. Appropriateness:

- How does the resource help you and the pupils to reach the defined teaching and learning goals?
- How and in what ways does the resource promote teaching and learning with regard to the defined learning goals?
- How does the didactical context differ from your goals and how do you handle these differences?
- How does the resource support your short-term and long-term lesson planning?

3. Clarity:

- Are the information and/or exercises presented clearly and logically? What clarifications are needed? Are the links to other resources valid and do they work?
- Do your pupils understand the presented material of the resource?
- What different levels of difficulty does the resources contain?
- Does it challenge all your pupils?

4. Completeness:

- What different levels of difficulty does the resources contain?
- Does this resource contain complete breadth and depth of information related to the topic it claims to cover?
- Does it challenge all your pupils?
- How does the resource help you and your pupils reflect on the learning outcome and achievements?

5. Motivation:

- Is the resource aimed at solitary or co-operative work? What other methods is the resource aimed for?
- How does the resource support the dialogical interaction between you and your pupils?
- How does it develop the pupil's creative and aesthetic abilities?

6. Organisation:

- In what ways can you and pupils control the learning outcome?
- What level of complex and analytical thinking does the resource demand?
- How do the resource support problem solving, and are different problem solving skills are needed?

APPENDIX

0.1 EXAMPLE OF AN EVALUATED WEB RESOURCE

On the 'Web for Teachers home' page (http://4teachers.org/)in the left hand column you find the link 'Lessons & WebQuests'. I chose 'Create-A-Habitat' from a list of links after going through three pop-up menus (Science & Technology, Life Science and finally Eco Systems & Biomes). The address is http://4teachers.org/intech/lessons/index.jsp?subject=8&theme=27&topic=215 but if you prefer to go directly to the source, it is http://www.biopoint.com/WebQuests/dist204/Welcome.html.

General information and impressions: It is a project work where the pupils need to work both as a group with four members and as individuals within that group. It requires ca 6 days of work in a middle school class. It does not mention what school year it is aimed for but in my opinion year 6 seems reasonable. The page is well structured and it is clearly stated what both the pupil and the group shall accomplish. It is actually a thematic work since the group must represent different skills like a plant and an animal biologist, an accountant and a project organiser. The work must be presented both written and orally. A habitat is also created based on the voting result for the best group.

Evaluation of the resource
I will use the questions I wrote below the heading 'Questioning insight when evaluating web resources' when evaluating this resource. Some of the paragraphs contain answers to more than one question. A few questions like "What do the pupils already know and what is new to them?" are omitted for obvious reasons.

'Create-A-Habitat' uses the learning technology (in this case the Internet connected computer using web based resources) in several different ways to promote both teaching and learning. The assignment is written and presented on the web, the resources are given, it supports the less able pupils but also gives opportunities to explore the different areas of the theme for the more advanced pupils. It seems to give the pupils sufficient opportunities to explore the resources by themselves. How well the group works plays an important role for the end result. The teacher's role is to support the group as well as the individual pupil.

Since it is a longer thematic work the teacher can choose how to fit it into the regular lesson plans. An advantage of having the class most of the school day, as is the case in middle school, is the teachers' ability to make flexible long-term plans. They can freely choose whether they need the advantages of either the short lesson or the long lesson. Compare the content of their page to table 1 in this report and you will observe

that this thematic work contains a mixture of what characterises both shorter and longer lessons.

The context may differ significantly if you want to apply a modified version of this resource in secondary or upper secondary school since you are usually bound by i.e. 45 or 90-minute lessons. One solution would be to co-operate with a mathematics teacher and thereby get more time for a thematic work like this one.

The intended use of this resource is clearly pointed out but the target group is somewhat diffuse. It could be year 5 as well as year 6, but I'm not sure.

The goals and the learning objectives presented seem general enough to be applicable to many teaching and learning needs in my opinion. It is very complex involving learning how to work in a group and also how to work individually within the group. It uses a democratic method when voting for the best habitat, several different skills are needed, and it has both short and long-term goals.

Since the resource is well structured and clear, it should be easy to point out how your teaching goals and the pupils learning goals can be met.

As pointed out the thematic work presents challenges that need many different skills and promotes different kinds of learning. The didactical context doesn't differ much from my own experiences when I taught in secondary school. I could have used it there with only minor modifications. The biggest problem would be how to engage a mathematics teacher to be able to get the necessary time for this thematic work.

Both group and individual work, give good opportunities to dialogical interaction. The learning outcome can thus be continuously monitored and it is predictable.

To create a living habitat involves both complex thinking and problem solving skills. Maybe this resource steers the pupils too much but it still seems reasonable for pupils in a middle school. They need to take into account many different factors that will influence the end result and also answer questions that will strengthen their scientific thinking. The questions demand both short and explaining answers.

The oral presentation has both "enthusiasm" and " creativity" as rubrics. I cannot detect any bias regards sex, religion etc in this resource. The outcome of this thematic work is the creation and maintenance of a habitat in a 10 US gallon tank (ca 38 litres), which should give opportunities to repeating discussions about i.e. eco systems and how they evolve with time.

Conclusions

This is a resource I would like to try to use with a middle school class. With some modifications it can also be used in secondary and even upper secondary school. It presents many different challenges both to the teacher and the pupils. It also has the potential of creating long term learning effects. When publishing a web resource there is always the problem of outdated links and it exists here too. This is my only major critique of this resource.

I spent ca two hours to evaluate this resource and write the evaluation.

0.2 WEB TOOLS

In this appendix we list a number of useful tools and references that might be useful for repository managers and for teachers who intend to publish learning material. The tools are organised into categories that cover performance, link consistency, functional, security tests and site management.

0.2.1 Performance Test Tools	
Name: SiteTools Loader	http://www.softlight.com/sitea/index.asp
Affordable and feature rich performance-testing tool from Softlight Technologies; allows for validation of HTTP status returned and the ability to perform both simple and complex validation steps. Requires WinNT and MSIE	
Name: Load	http://www.pushtotest.com/
Build intelligent test agents with Load for Web service scalability and performance testing. Load shows how your Web service will perform under real world stress. Afterwards the same test agent monitors the Web service and provides proof of meeting a Service Level Agreement (SLA.)	
Name : Siege	http://joedog.org/siege/

Siege is an http regression testing and benchmarking utility. It was designed to let web developers measure the performance of their code under duress, to see how it will stand up to load on the internet. Siege supports basic authentication, cookies, HTTP and HTTPS protocols. It allows the user hit a web server with a configurable number of concurrent simulated users. Those users place the webserver "under siege." Siege was written on GNU/Linux and has been successfully ported to AIX, BSD, HP-UX and Solaris. It should compile on most System V UNIX variants and on most newer BSD systems. Because Siege relies on fork(), a feature not supported by Microsoft, it will not run on Windows. Of course you can use Siege to test a Windows server.	
Name: Empirix	http://www.empirix.com/
Empirix provides a broad range of testing and monitoring solutions designed to ensure the quality and performance of Web applications throughout the life cycle Empirix integrated Web testing products and hosted services support our "test early-test often" philosophy that begins with testing at the software component level and continues through system integration to deployment.	
Name: Webeserve stresser tool	http://www.paessler.com/
Simulates simultaneous users accessing a web server and helps to streamline your web application. Essential for every web developer, webmaster or web marketer.	
Name: Web Polygraph	http://www.web-polygraph.org/
Web Polygraph is a freely available benchmarking tool for caching proxies, origin server accelerators, L4/7 switches, content filters, and other Web intermediaries. Polygraph's features include: • high-performance HTTP clients and servers • realistic traffic generation and content simulation • ready-to-use standard workloads • powerful domain-specific configuration language • portable open-source implementation	
Name:WebPerformance Trainer	http://www.webperformanceinc.com/

Load test tool emphasizing ease-of-use. Supports all browsers and web servers; simulates up to 400 users per playback machine at various connection speeds; records and allows viewing of exact bytes flowing between browser and server; no scripting required. Modem simulation allows each virtual user to be bandwidth limited. Can automatically handle variations in session-specific items such as cookies, usernames, passwords, and any other parameter to simulate multiple virtual users. For NT, Linux, Solaris, most UNIX variants.	
Name: Web Application Stress	http://webtool.rte.microsoft.com/default.htm
Microsoft Web Application Stress is a simulation tool that is designed to realistically reproduce multiple browsers requesting pages from a web application. It was developed by web testers. We have made the tool as easy to use as possible by masking some of the complexities of web server testing. This makes the tool desirable for anyone interested in gathering performance data on their web site.	
Name: Astra Loadtes	http://www-svca.mercuryinteractive.com/products/
Mercury Interactive's products and managed services help test, identify, isolate and fix performance bottlenecks in your IT infrastructure. Our enterprise testing and application performance management solutions help maximize application performance by not only measuring response time, but also verifying content and business processes.	
0.2.2 Link Checking Tools	
Name: Linkbot Personal	http://www.watchfire.com/
Linkbot Personal scans up to 1000 links checking for more than 50 potential types of problems that affect website content including broken links, slow pages, old pages, and more. It helps by mitigating corporate risk, enhancing web team effectiveness, and addressing critical website issues that can affect visitor success.	
Name: LinkGuard Online	http://www.linkguard.com/

LinkGuard provides hosted link management services that protect the integrity of a web site by automatically scanning and reporting on broken links.	
Name: InfoLink	http://www.biggbyte.com/infolink/index.html
InfoLink is valuable Internet utility for anyone who manages a WebSite. InfoLink allows you to create a site list of all the sites you need to verify, thereby eliminating the need to enter information each time verification is performed	
Name: CyberSpyder Link Test	http://www.cyberspyder.com/cslnkts1.html
CyberSpyder Link Test is a Web site management program to be used for verifying that the URLs on a site are not broken and for analyzing site content. It is designed to be used on sites of all sizes; from the very small personal or business Web site with only a few pages, to the very large corporate site with thousands of links. The program includes features found in more expensive programs, but at a price affordable by the owner of a small personal site.	
Name:Xenu's Link Sleuth	http://home.snafu.de/tilman/xenulink.html
Xenu's Link Sleuth (TM) is a spidering software that checks Web sites for broken links. Link verification is done on "normal" links, images, frames, plug-ins, backgrounds, local image maps, style sheets, scripts and java applets. It displays a continously updated list of URLs which you can sort by different criteria	
Name: LinkAlarm	http://www.linkalarm.com/
LinkAlarm is an online web service that checks every link on every page of your site. Checking starts automatically as often as you require. The service works on any site of any size including secure servers and web databases. There's nothing to install on your server or PC - all you need is a browser. And you can use LinkAlarm from anywhere on the net.	
Name: W3C HTML Validation Service	http://validator.w3.org/

HTML validation site run by the WWW Consortium (the folks who set web standards); handles one URL at a time; Can choose from among 30 character encoding types, and multiple HTML and XHTML document types/versions. A CSS validation tool/service is also available.	
Name: Doctor HTML	http://www2.imagiware.com/RxHTML/
Doctor HTML is a Web page analysis tool which retrieves an HTML page and reports on any problems that it finds. The primary focus of this tool is to provide a clear, easy-to-use report of information that is relevant for improving your Web page.	
0.2.3 Functional Tools	
Name: Test Web	http://www.origsoft.com/
Test tool from Original Software utilises a new approach to recording/playback of web browser scripts. It analyses the underlying intentions of the script and executes it by direct communication with web page elements. IntelliScripting logic removes the reliance on specific browser window sizes, component location and mouse movements for accurate replay, for easier script maintenance; supports hyperlinks targeted at new instances of browser. For all platforms.	
Name: eValid	http://www.soft.com/eValid/summary.html
EValid is a test engine that provides with browser based 100% client side quality checking, dynamic testing, content validation, page performance tuning, and webserver loading and capacity analysis.	
Name: Rational Robot	http://www.rational.com/products/
Rational's automated functional testing tool; allows user to create, modify, and run automated functional, regression, and smoke tests for e-applications built using a wide variety of independent development environments. Rational TestManager and Rational SiteCheck are included, enhancing ability to manage all test assets and have them available to all team members; includes capabilities for for Web site link management, site monitoring, and more. Supports a range of environments and languages, including HTML and DHMTL, Java, Microsoft Visual Basic and Visual C++, Oracle Developer/2000, Delphi, SAP, PeopleSoft, Powerbuilder.	

Name: WEBART™	http://www.oclc.org/webart/
WEBART™ is a nuts-and-bolts test-automation tool developed by OCLC for testing World Wide Web. internet, and intranet applications and content. It provides a direct, cost-effective solution for creating, executing, and evaluating automated tests that verify your application and web site. WebART™ provides a complete solution for large scale functional, regression, and performance testing of commercial WWW applications.	
Name: Segue	http://www.segue.com/
Segue's testing tool for functional and regression testing of Web, Java or traditional client/server applications. Utilises their 4Test scripting language. Includes a recovery system that allows running of unattended tests. Can test across multiple browsers and windows versions, and against over 35 Databases.	
0.2.4 Security Tools	
Name: QualysGuard	http://www.qualys.com/services/index.html
QualysGuard™, Qualys's flagship service, is an online vulnerability assessment solution that evaluates the security of networks remotely. QualysGuard provides comprehensive, on-demand security audits that identify, analyse, and report on network security threats. By focusing on networks from a "hacker's eye view" perspective, Qualys identifies real-world weaknesses that would elude traditional security solutions.	
Name: STAT Scanner	http://www.statonline.com/products/scanner/professional/index.asp

STAT Scanner Professional Edition performs a complete security analysis of Windows NT/2000/XP and Sun Solaris UNIX / RedHat Linux resources. Enables users to accurately identify and eliminate network security deficiencies that can allow hacker intrusion. Capabilities include: scan and analyse an entire network domain and/or a single machine, select or ignore specific vulnerabilities via configuration files, analysis reports of vulnerabilities with detailed information relating to the name/description/risk level of each vulnerability, eliminate vulnerabilities using recommended solutions with links to related websites and knowledge-base articles, correct vulnerabilities across the network with 'AutoFix' function, retest corrected vulnerabilities immediately, track vulnerability trends via analyses comparing current and previous assessments, customise security reports for management and technical personnel with comprehensive reporting of selected machines or entire domains.	
Name:	http://www.it.nessus.org/
Free, open-source remote network security auditing tool based on 'never trust the version number and 'never trust that a given service is listening on the good port. Nessus will detect it and test its security. It will not make its security tests regarding the version number of the remote services, but will really attempt to exploit the vulnerability. Here are the features of the Nessus Security Scanner : Plug-in architecture, Up-to-date security vulnerability database, Client-server architecture, Can test an unlimited amount of hosts at the same time, Smart service recognition, Multiples services Tests co-operation, Cracker behaviour, Complete reports, Exportable reports, Multilingual support, Independent developers, Easy-to-reach developers	
Name: SAINT	http://www.wwdsi.com/saint/
SAINT™ is the Security Administrator's Integrated Network. A security testing tool source code from World Wide Digital Security Inc it gathers as much information about remote hosts and networks as possible by examining such network services as finger, NFS, NIS, ftp and tftp, rexd, statd, and other services.	
Name: SATAN	http://www.fish.com/satan/

SATAN (Security Administration Tool for Analyzing Networks for UNIX) is a tool to help systems administrators. It recognizes several common networking-related security problems, and reports the problems without actually exploiting them. Includes tutorial that explains problems found, what its impact could be, and what can be done about it: correct errors in a configuration file, install vendor bugfixes, use other means to restrict access, or disable service. Includes some links to related information.	
Name: Nmap	http://www.insecure.org/nmap/
Nmap ("Network Mapper") is an open source utility for network exploration or security auditing. It was designed to rapidly scan large networks, although it works fine against single hosts. Nmap uses raw IP packets in novel ways to determine what hosts are available on the network, what services (ports) they are offering, what operating system (and OS version) they are running, what type of packet filters/firewalls are in use, and dozens of other characteristics. Nmap runs on most types of computers, and both console and graphical versions are available. Nmap is free software, available with full source code under the terms of the GNU GPL.	
0.2.5 Management Tools	
Name: Alchemy Eye	http://www.alchemy-lab.com/products/eye/
Alchemy Eye is a network management tool that continuously monitors server availability and performance. In the event of network errors, Alchemy Eye can alert the network administrator by cell phone or pager BEFORE problems get seriously out of hand.	
Name: Webfeedback	http://www.liebhart.com/webfeedback/index_e.html
Webfeedback is an innovative software for the analysis of visitor traffic of websites and web systems. Functions: tracks "dead" links and displays them in red color; check the incoming or outgoing links of a specific page:outgoing links: all pages which can be accessed from a page, incoming links: all pages which point to the defined page	

Name: SiteMapper	http://www.trellian.com/mapper/
SiteMapper analyzes the contents of a web site, and create a detailed map with an indexed listing of all resources by page and category. It also validates all links, so that users need never come across 'File not found' errors and broken images.	
Name:Rhythmyx Content Manager	http://www.percussion.com/
Web content management product based on native XML and XSL technologies; content development, publishing, version control, and customizable workflow.	
Name: WebCeheck	http://www.itutils.com/
WebCheck is a website monitoring and server monitoring software around. *WebCheck can monitor:* • site's internet connection • database • eerver side scripts, applications, executables, and objects • Web server performance • Tampering by hackers • Server side programming mistakes • rcreate custom procedures to check anything	
Name: WebSite Manager	http://www.morning.asn.au/siteman/smintro.htm
SiteMan (WebSite Manager) is a collection of software tools used to systematically manage and edit the files that comprise a Internet website : their directory structure; their text and HTML content; their links and pointers	
Name: RadView	http://www.radview.com/default.asp
RadView provides software testing tools that feature JavaScript test-agenda creation for performance testing, load testing, and functional testing of website applications.	

0.3 SUGGESTED LINKS

These links can hopefully help you locate information on how to improve your teaching by using resources on the web. It is not intended for any special category of K-12 teachers and also if you are a novice or a more experienced Internet user. The links span from link repositories to individual articles. The novice user will probably benefit mostly from their national repository.

A few sites have been chosen related to distance education since quality issues within this field have been discussed in relation to technology for a much longer time than within on-campus education
The dominant language on the web is English and it is therefore quite natural that many English and American resources are found in this short list. The awareness of social and cultural differences especially when it concerns non Anglo-Saxon countries is considered, but intention is to give a subjective selection to make it easier to explore a few relevant resources.

The accompanying link texts are with few exceptions directly pasted from the web sites. All links have been visited or revisited during November 2001.

0.3.1 E**uropean web resources**

Eschoolnet
http://eschoolnet.eun.org
A service provided by the European Schoolnet which is an international partnership of more than 23 European Ministries of Education developing learning for schools, teachers and pupils across Europe.

ICT in Education News
http://www.becta.org.uk/news/ictnews/index.html
Becta seeks to: evaluate information and communications technology (ICT) practice, support existing applications of ICT, investigate emerging technologies and associated pedagogy.

Schulweb
http://www.schulweb.de/
A school portal with pages also in English, French and Russian.

Swedish Schoolnet
http://www.skolverket.se/skolnet/english/index.html

Computers in Teaching and Learning (CITAL)
http://www.staffs.ac.uk/cital/welcomeframe.html

This site is designed to cover everything related to the use of Communications and IT in the Teaching and Learning processes. Staffordshire University, UK.

BUBL LINK: 370 Education
http://link.bubl.ac.uk/education/
"The aim (of BUBL 5:15) is to guarantee at least 5 relevant resources for every subject included, and a maximum of 15 resources for most subjects, hence the name 5:15. Big subject areas are broken down into smaller categories."
BUBL Information Service, Strathclyde University, JISC

What's New in eLearning
http://europa.eu.int/comm/education/elearning/what.htm
News from the eLearning initiative of the European Commission.

Eurydice
http://www.eurydice.org/
The information network on education in Europe

Principles and Issues in Education in Denmark
http://www.uvm.dk/eng/publications/1prin/index.htm
This publication gives a description of the issues and reforms which have characterised the educational debate in recent years. The publication on the one hand deals with issues which are common to all areas of education, and on the other hand it describes the individual areas and their characteristic features. The chapters on the individual areas of education are introduced with a factual description of the area (Ministry of Education).

Quality Standards:The Norwegian Association for Distance Education
http://www.nettskolen.com/forskning/18/kvalen1.htm
The individual distance education institutions are very different from each other in purpose, type of activities, resources and size. It is therefore difficult to devise quality standards that are equally applicable despite these differences. NADE's standards should be guidelines, and must give the individual institution sufficient freedom to define quality requirements on the basis of their own circumstances and possibilities. At the same time the standards must establish certain minimum requirements that are expected to be met if the institution is to attain an acceptable level of quality.

0.3.2 Non-European web resources

How do I integrate Internet into my classroom curriculum?
http://www.cyberbee.com/intclass.html
Now that I have a connection to the Internet, what do I do with it? This is a very valid question that is asked hundreds of times on listservs, at conferences, and in school

faculty meetings. Common statements range from I don't have time to do one more thing to where do I go for examples? This page is dedicated to examples of how the Web can be used in the classroom.

A to Z teacher stuff
http://www.atozteacherstuff.com/
Find online lesson plans and lesson plan resources, thematic units, themes, classroom activities, teacher tips, web projects, discussion, educational ideas.

Teaching and Learning on the Web
http://www.mcli.dist.maricopa.edu/tl/
Here you'll find over 804 examples of how the web is being used as a medium for learning. How can the Web be used for something more than surfing, chatting, making money, or idly wasting time? Can it provide an environment for learning? We found that people learn well from examples, so we created for our faculty this collection of the ways the web was being used in different disciplines.

Web for Teachers
http://www.4teachers.org/
The whole site is devoted to teachers who want to use IT in education.

Ethics in Computing
http://www.eos.ncsu.edu/eos/info/computer_ethics/
A repository with many valuable links.

Evaluating Websites
http://servercc.oakton.edu/~wittman/find/eval.htm
Not all of the information to be found on the World Wide Web is accurate and not all websites, no matter how attractive, are good. Thus evaluating a website becomes an important activity. When evaluating a website, consider the following questions:
Who wrote the pages? What does the author have to say about the subject? Does the author have the authority to present this information?
Does the author/publishing organization have anything to gain by presenting this information? When was the site created and updated?
Where does the site's information come from? Is the information consistent with other published material on the topic? Why it the site useful or important? Can the information be verified in book, periodical or other sources? Links to numerous Web Articles on Evaluation is also provided.

Creating A New Culture of Teaching and Learning
http://www.anovember.com/articles/asilomar.html

Article based on a presentation given by Alan November at the February 1998 Asilomar Symposium on "Standards, Students, and Success".
"Don't do technology plans! The big change that's coming is not technology -- it's relationships. Connecting people together is the big change."

Critical Issue Bibliography (CRIB) Sheet:Improving Teaching and Learning
http://www.eriche.org/crib/improving.html
Several Critical Issues Bibliographies (CRIBs) Learning Communities, Collaborative Learning, and Technology in the Classroom review techniques or approaches to improving teaching and learning. The purpose of this CRIB sheet is to present resources that focus on improvement from a systems perspective, examining structural and cultural changes.

Credibility of the Web: Why We Need Dialectical Reading
http://www.lis.uiuc.edu/~chip/pubs/credibility.shtml
Is the web a bountiful source of information and resources on every conceivable topic, as some claim? Or, is it unreliable, ephemeral, and over-commercialized as others warn? Do we need to develop criteria for evaluating web pages to separate the good from the bad? Is the web a fundamentally different medium that requires new modes of critique?
This essay explores how characteristics of the web lead to it being simultaneously a great and a questionable source of information. The issue then becomes how we should read such a complex and contradictory text.
Bertram C. Bruce. Journal of Philosophy of Education (special issue), 34(1), 97-109.

Towards Well-Balanced Technology-Enhanced Learning Environments
http://www.cmec.ca/reports/infoteche.stm
The present document aims to present 1) an overview of the needs and possibilities created by the ICTs; 2) competing visions in the face of coming changes; 3) an argument regarding cost effectiveness in education: a crucial element resulting from the changes in the role of the players and use of the ICTs; and 4) suggestions for a CMEC strategy on information and communications technologies. Thus, rather than providing an exhaustive view of the problems, questions and solutions, this document highlights important issues for CMEC's decision-making process regarding its strategy on information and communications technologies.
Council of Ministers of Education, Canada / Conseil des ministres de l'education (Canada)

Explorations in Learning & Instruction: The Theory Into Practice Database
http://tip.psychology.org/

TIP is a tool intended to make learning and instructional theory more accessible to educators. The database contains brief summaries of 50 major theories of learning and instruction. These theories can also be accessed by learning domains and concepts.

Open Directory - Reference: Education
http://dmoz.org/Reference/Education/*and*
http://dmoz.org/Reference/Education/Instructional_Technology/
Also available in 24 other languages besides English.

Distance Education Clearinghouse - University of Wisconsin, USA
http://www.uwex.edu/disted/k12.html
Distance education resources included in this K-12 section are primarily for teachers, however, some may also be of interest to K-12 students and parents.

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