



**CRITERIA FOR THE EVALUATION OF ELECTRONIC LEARNING  
ENVIRONMENTS**  
Intermediate report



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## 1 Introduction

This report is the first in a series of three as part of a request to the Maastricht McLuhan Institute from the UNESCO to conduct a review of electronic learning environments and their adaptation for Africa. This review is part of the AfSEdNet project, a Multi-Media Virtual Network for the enhancement of Science, Mathematics and Technology Learning in Sub-Saharan Africa. AfSEdNet is a project of UNESCO and the World Bank.

In this report, we present a set of categories and their descriptions for describing and comparing electronic learning environments.

The section 2 describes the actual assignment, followed by the interpretation used by the authors.

The section 3 deals with the approach taken to come to criteria categories. It describes why the focus is on description of functionality instead of features. Additionally it pays attention to the difference between pedagogy and didactics as a means of describing electronic learning environments.

The sections 4 and 5 describe the criteria categories for the Institution and the student respectively.

As mentioned above, this report is the first in a series to arrive at the final deliverable, i.e., a review of electronic learning environment. The next steps are to identify methods and tools on the market and in the public domain worldwide; a primary evaluation and a short list; an in-depth comparative evaluation of short-listed methods and tools.

## 2 Review Task

The assignment of the UNESCO to the Maastricht McLuhan Institute was to carry out a review of the latest developments in methodologies and tools for flexible learning and teaching, as well as their adaptation to Africa. The aim of the review is to cover state-of-art information technology (IT) based tools.

Central in this review are IT-tools:

1. for authoring, teaching/learning and related collaboration activities;
2. for teaching and learning science, mathematics and technology in secondary schools;
3. susceptible for efficient use in a multi-lingual, multi-country, multi-media network context.

### 2.1 Interpretation

As with most assignments, there is room for interpretation. In this case, the central problem for the MMI was to interpret the importance of the region, i.e. the Sub-Saharan Africa. One of the obvious problems for this region is the geographical vastness, and the lack of sufficient infrastructure. Given these problems, it seems logical to interpret the assignment such that the educational technology must fit these restrictions. If this is not the case, then we can safely discard that technology.

The authors chose to adopt a more optimistic interpretation, leading to a wider choice of environments. The three explicit criteria mentioned above do not mention infrastructure and geographical vastness as a criterion. It does mention *multi-lingual* and *multi-country*, which are other parameters for geographical vastness. The authors assume that other members of the AfSEdNet solve the infrastructure problems.

Another aspect that leaves room for interpretation is if the tools must be specifically designed for learning science, mathematics and technology in secondary schools. The authors chose not to restrict the review to this domain, to make sure that domain-independent tools are included, and to check if tools from other domains are appropriate.

## 3 Approach

After deciding upon the interpretation of the assignment, the authors checked current references on electronic learning environments. Some of these references were about evaluations and others about the description of tools. (See section 6 below)

### 3.1 Description versus assessment

Some of the references contain a large number of topics for describing the tools. However, in general they address many different facilities at a micro level, for example, "Does the system support chat?" In our opinion, this leads to detailed feature comparison without an overall functionality comparison. In this report, the authors chose to describe *functionality*. This opens up the possibility to compare learning environments with different implementations of the same functionality. The actual comparison then, also contains a valuation of the specific



implementation in a product to provide certain functionalities.

The benefit of this approach is that the reader is better able to deviate from the assessment and the choice made by the authors, i.e., the reader has more information to make a different choice.

### 3.2 Pedagogy and Didactics

Another important difference with previous evaluations is the inclusion of pedagogic principles and didactic forms.

This requires some elaboration by the authors on these terms, because there is a definition difference between Anglo-Saxon world and the European continent about the terms pedagogy and didactic.

In this report, the term pedagogy is used as the “the art of raising children”. Thus, pedagogy includes more than education. It refers to, for example, raising children to become responsible citizens with a tendency to collaborate with others, or to become responsible citizens with the ability to compete with others.

Didactic, however, refers to the art of teaching, or teaching methods. For example, if an institution wishes to deliver students with good collaborative skills for solving problems, then didactic provides teaching methods to improve those skills. In this respect, an electronic learning environment is a didactic tool to accomplish some pedagogic goal.

Tools help people to accomplish a certain goal. However, which tool is used depends on the vision how to reach that goal. This means that *one tool* can help to reach *different goals*, but also that *different tools* can help to accomplish *the same goal*.

In the environment descriptions, we always ask for the pedagogic principles behind the electronic learning environment. However, note that expert opinions might differ as to the extent that the didactics employed in the learning environment help to reach the pedagogic goals.

For this reason, the didactical methods used were included in the description list.

### 3.3 Categorization

For the description of the tools, the authors make a distinction between the two main partners in the learning: the institution and the student. Instinctively, one would choose the dichotomy teacher-student. However, the teacher is only one of all possible actors in the student’s education. Other possible actors are: tutors, administration, experts, etc. However, to the student they are all part of the same body, i.e., the educational institution.

Taking this dichotomy, each part has its own requirements even though the general label is the same, such as “Costs”. To the student, costs refer to expenditure made in order to follow the education, such as for an Internet account, on-line duration, personal machine, printer, software, access to information banks, etc. For the institution, costs refer to required finances for licensing the software, maintenance of the equipment, training teachers and administrators, etc.

Below we give a short overview of the categories used for the classification of functionality. Each category is further divided in functions that are more specific.



1. Institutional aspects
  2. General
  3. Management & Organisation
  4. Educational process management
  5. Communication facilities
  6. Information distribution
  7. Test administration
  8. Technical aspects
  9. Costs
2. Student aspects
  1. Client environment management
  2. Study process management
  3. Communication facilities
  4. Personalised learning space
  5. Assessment
  6. Technical requirements
  7. Costs

## 4 Institutional aspects of the system / environment

<p><b>General Information:</b> This refers to those aspects of the environment that give insight in the company and the environment within the educational field</p>	<p><b>Home base and agent locations</b> This refers to the home base of the company and to the availability of support in other countries.</p>
	<p><b>Language</b> This refers to the system's localisation and the availability of other language versions, and secondly, to the possibility for users with different languages to work with the system. Location refers to language, metric system, date notation, currency, etc.</p>
	<p><b>Target users</b> This refers to the users that are actually targeted. This may be different from the total installed base and actual user, for example in commercial groupware applications where project teams are the targets users.</p>
	<p><b>Target domain</b> This refers to the domain the system is designed for, such as science or art courses. For example, if the target domain is mathematics, then it might include features that enable a user to edit formulas</p>
	<p><b>Installed base &amp; Users</b> This refers to the number and type of users that have the environment installed.</p>
<p><b>Management &amp; organisation:</b> This refers to those aspects of the environment that allow for those processes which are part of the normal administration of education such as individual / group / class scheduling, assignment of people to places and functions, et cetera.</p>	<p><b>Intake and subscription</b> This refers to tools available for on-line intake and subscription of students to follow courses, lessons, assignments, and tests.</p>
	<p><b>Planning &amp; Scheduling</b> This refers to tools that are available for planning and scheduling of courses, lessons, and assignment of human and other resources.</p>
	<p><b>Tracking</b> This refers to tools that allow the management to track whether or not students have fulfilled their educational obligations, and their progress. It refers to the administrative obligation of the institution to know where their clients are, what they do next and how much time they have left.</p>
	<p><b>Actors &amp; Roles</b> This refers to the ability to assign people and different roles for administrative purposes. Examples are: bank (financial transactions), support staff, students, students groups, external experts, teachers, group supervisors, counsellors, tutors, etc.</p>
<p><b>Educational process management:</b> This refers to those aspects of the environment that addresses the pedagogic principles used and the degrees of freedom for didactical use of materials, the integration of materials into the learning environment and the administration of the learning processes of (groups of) students.</p>	<p><b>Pedagogic principles</b> This refers to the pedagogical vision (if any) behind the learning environment. This may clarify the type of work forms chosen to provide in the environment. For example: community building.</p>
	<p><b>Didactic forms</b> This refers to the teaching methods the teacher is able to use in the environment. For example: expository, problem based, project based, individual study, group study (collaboration, co-operation), discovery learning, etc.</p>
	<p><b>Actors &amp; Roles</b> This refers to the people identified and their roles for strict educational purposes. Examples are: students, students groups, external experts, teachers, group supervisors, counsellors, tutors, etc.</p>



<b>Communication facilities:</b> This refers to those aspects of the environment that allow for the ability to communicate between users (including administration) as well as between the user and the system	<b>Synchronicity</b> This refers to the temporal aspects of communication. For example, does the system allow for both synchronous and asynchronous communication, or just for one of these?
	<b>Information sharing</b> This refers to the ability to share information in different ways. Does the system allow for the exchange of information, and does it allow for simultaneous work on documents or on applications?
	<b>Communication means</b> This refers to the available communication forms that are either built-in or standard applications outside the system. Examples are: mail, discussion, chat, whiteboard, meeting, etc.

<b>Information distribution:</b> This refers to the aspects of the environment that relates to the exchange of data in the environment between staff and system, staff amongst one another, content authoring and data conversion.	<b>Authoring of content</b> This refers to the possibilities for authoring of course materials by teachers using authoring software, html-editor or standard software suites.
	<b>Authoring of support</b> This refers to authoring tools for creating feedback by teachers.
	<b>Curriculum design</b> This refers to the availability of tools for designing courses and relations between courses in a coherent curriculum.
	<b>Differentiation with respect to content</b> This refers the possibility of personalising the content (including tasks, examples, etc.) to students and groups of students according to their characteristics, such as prior knowledge.
	<b>Differentiation with respect to style</b> This refers to the possibilities to tailor the look and feel of the system to the institutions house style and image.
	<b>Media support</b> This refers to the possibilities of using standard or build-in media tools and the ease of converting data. For example: text, graphics, photos, sound, video, and streaming video.
	<b>Updating and upgrading</b> This refers to the possibilities and facilities for updating and upgrading information and applications during the course.

<b>Test administration:</b> This refers to the intake, progress and certification of the student from the institution's point of view, i.e. test administration, analysis, item banking, authoring, et cetera.	<b>Item and test construction</b> This refers to functionality that allows teachers to construct test items and tests.
	<b>Item and test formats</b> This refers to available formats of the items, such as multiple choice, short answers, essay, and the possibility to mix these in one test.
	<b>Assessment forms</b> This refers to the possibility to choose different forms of student assessment during intake, progress and certification.
	<b>Diagnostic tests</b> This refers to the use of individual diagnostic tests in order to take prescriptive measures about the student's progress.
	<b>Item banking</b> This refers to the availability of an item bank to allow the institution to select items based on criteria to use them in constructing a new test.
	<b>Item and test analysis</b> This refers to the use or availability of statistical procedures to analyse items and tests.
	<b>Personalisation to the institution</b> This refers to the possibility of tuning the system to education, exam rules, and end terms.



<b>Technical aspects:</b> This refers to those technical aspects of the environment which have to be taken into account by the institution with respect to the implementation, upkeep and functioning of the environment.	<b>Specifications</b> This refers to hardware, software and network bandwidth specifications, and the institution's flexibility to deviate from these specifications. For example, does the system use a network, what are the necessary stand-alone facilities?
	<b>Technical support</b> This refers to the availability of built -in support or a (on-line) helpdesk for institutional users.
	<b>Security</b> This refers to the security measures the system offers, such as encryption, use of Secure Socket Layer, and authentication.
	<b>Scalability</b> This refers to the possibility and the constraints to scale the system to different numbers of users.
	<b>Installation</b> This refers to the way installation is organised, and if integration with other applications of suites is supported (For example: MS Office, ERP).

<b>Costs:</b> This relates to costs that are incurred for the institution in terms of people, money and infrastructure (hardware, software, networks)	<b>Initial</b> This refers to initial costs for hardware, software and infrastructure.
	<b>Maintenance</b> This refers to the costs for the management of hardware, software, supplies and infrastructure while using the system.
	<b>Licensing</b> This refers to costs involved in purchasing the rights to use the system as host, client or both.
	<b>Payment scheduling</b> This refers to payment conditions and third party payment or taxi metering.
	<b>Training</b> This refers to training costs for the educational institution. For example: school support staff, techno structure, and primary process.



## 5 Student aspects of the system / environment

<b>Client environment management:</b> This refers to those aspects of the environment that allow the student to regulate his/her own education such as scheduling learning, scheduling counselling and support, scheduling synchronous meetings et cetera.	<b>Personal study planning &amp; scheduling</b> This refers to the supported planning and scheduling tools (such as calendar and agenda) for students to organize their own study at both course and curriculum level.
	<b>Personal scheduling of classes</b> This refers to the possibilities for subscription and the supported scheduling tools for students on course level.
	<b>Educational news facilities</b> This refers to availability and the place of news and announcements on curriculum and on course level.
<b>Study process management:</b> This refers to those aspects of the environment that allow the student and the institution to model the materials, the learning environment and the planning of the learning processes of the (individual) students	<b>Group memberships</b> This refers to the facilities for arranging learning with others.
	<b>Educational personalisation</b> This refers to facilities for personalisation of content, time, place and pace.
	<b>Personal study tracking</b> This refers to review of achievements in assignments and exams, to determine how ones study is proceeding.
<b>Communication facilities:</b> This refers to those aspects of the environment that allow for the ability to communicate and share information between students amongst themselves, groups of students, students with staff and other experts	<b>Synchronicity</b> This refers to the extent in which the system supports synchronous and asynchronous communication with other actors and the system itself.
	<b>Information sharing and exchange</b> This refers to the extent in which students can share or exchange information with other students.
	<b>Off-line study</b> This refers to the possibilities of off-line study.
<b>Personalised learning space:</b> This refers to the aspects of the environment which relate to the tailoring of the environment (and the data therein) to the specific needs and wishes of the student including authorisation possibilities	<b>Private spaces</b> This refers to the possibilities for creating a personalised environment within the system. For example, overview of tasks, pacing of assignments, deadlines, and warnings.
	<b>Public spaces</b> This refers to the availability of a public space for groups and peers.
	<b>Portfolio building</b> This refers to possibility to electronically archive and retrieve assignments and products.
	<b>Authorisations for access by others</b> This refers to possibilities for students to authorise others to access certain personal files.
<b>Assessment:</b> This refers to the possibility for the student to make use of intake, progress and certification assessment, i.e. on-line testing, computer marked assignments, diagnostic / prescriptive placement and testing.	<b>Intake</b> This refers to facilities within the environment that help students to determine gaps in their own knowledge.
	<b>Progress monitoring / Self testing</b> This refers to feedback with computer-marked assignments and teacher-marked assignments, and to intermediate testing for periodical feedback on achievements.
	<b>Certification</b> This refers to subscription to a test or of on-line certification.
	<b>Diagnostic testing</b> This refers to tests with analytical purposes and diagnoses with alternative learning activities to compensate for gaps in knowledge and skills.



<b>Technical requirements:</b> This refers to those technical aspects of the environment that have to be taken into account by the student in order to implement and keep the environment functioning.	<b>Machine</b> This refers to the computer system required, processor, storing facilities, plug-ins, graphical and sound equipment, modem speed, and printer, for the student to study efficiently and effectively.
	<b>Connection bandwidth</b> This refers to required modem speed and telecom facilities.
	<b>Software</b> This refers to software and plug-ins for the learning environment.
	<b>Installation</b> This refers to the ease of, and procedure for installation of the software.
	<b>Technical support</b> This refers to built in, on-line support and helpdesk for students.

<b>Costs:</b> This relates to costs that are incurred for the student in terms of money and infrastructure (hardware, software, provider) for following education with the environment.	<b>Hardware, including peripherals</b> This refers to the costs of hardware facilities.
	<b>Software</b> This refers to costs of software for the student.
	<b>Fees</b> This refers to costs for the student for licences and copyright, such as in using on-line journal databanks.
	<b>Connection / on-line costs</b> This refers to the possibility to download and upload files and work off-line.



## 6 References

- UNESCO, Terms of Reference (Activity 7 in the AfSEdNet Memorandum of Understanding), Draft. Jan 11, 2000
- British Educational Communications and Technology agency (Becta), Guidelines on the production of an ILT Strategy for FE Colleges, <http://ferl.becta.org.uk/> Access date 15.03.2000.
- Cole, Jenny, Draft Guidelines on the production of an Information and Learning Technology (ILT) Strategy for Further Education Colleges, [jenny\\_cole@becta.org.uk](mailto:jenny_cole@becta.org.uk) Access date 15.03.2000.
- Diversity University, Online learning environments compared, 1997, <http://www.du.org/duinc/learnenv.html>, Access date 15.03.2000
- Droste, Joke, Advies keuze teleleerplatforms, CINOP / Stichting SURF, 1999
- Droste, Joke, Een vergelijkend onderzoek naar teleleer-platforms als hulpmiddel voor het flexibiliseren van leer- en doceeromgevingen, Cinop 1998
- Landon, Bruce, Online educational delivery applications: a web tool for comparative analysis, <http://www.ctt.bc.ca/landonline/>, Access date 15.03.2000.
- Laurel, Humberto, Web Site designed for Math Teachers, University of Texas, Austin <http://www.edb.utexas.edu/csclstudent/laurel/>, Access date 15.03.2000
- <http://www.minocw.nl/infotech/index.htm>
- Veen, Jan van der, Boer, Wim de, World Wide Web Learning Support (W3LS), Evaluatieraamwerk voor WWW-leeromgevingen, Surf Educatief 1999
- Vries, Pieter de (ed), *Telelearn Report 1: costing issues in flexible and distance learning*, Telelearn project, 1999.
- Vries, Pieter de (ed), *Telelearn Report 2: case studies report*, Telelearn project, 1999
- BVE-net en Cinop: <http://www.teleleerplatforms.nl/>